THE JOURNAL OF GAS LIGHTING
WATER SUPPLY & SANITARY IMPROVEMENT

VOL. LXXXV. No. 2127.] LONDON, FEBRUARY 16, 1904. [56TH YEAR. PRICE 6d.

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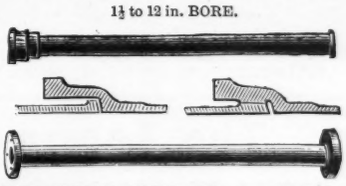

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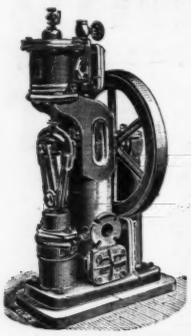

Fig. 705. "SINGLE RAM" STEAM-PUMP.

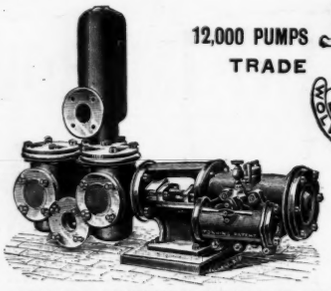

Fig. 598. "CORNISH" STEAM-PUMP FOR BOILER FEEDING, &c.

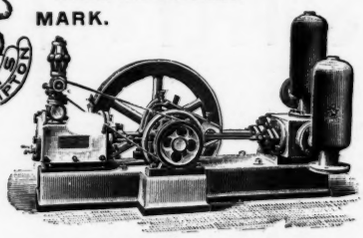

Fig. 685. "RELIABLE" STEAM-PUMP FOR TAR AND THICK FLUIDS.

Fig. 712. "DOUBLE-RAM" STEAM-PUMP.

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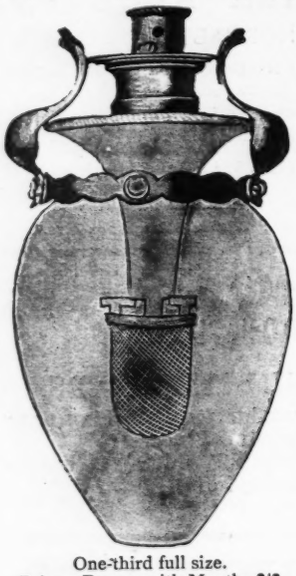

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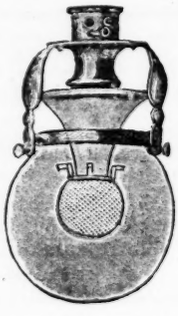

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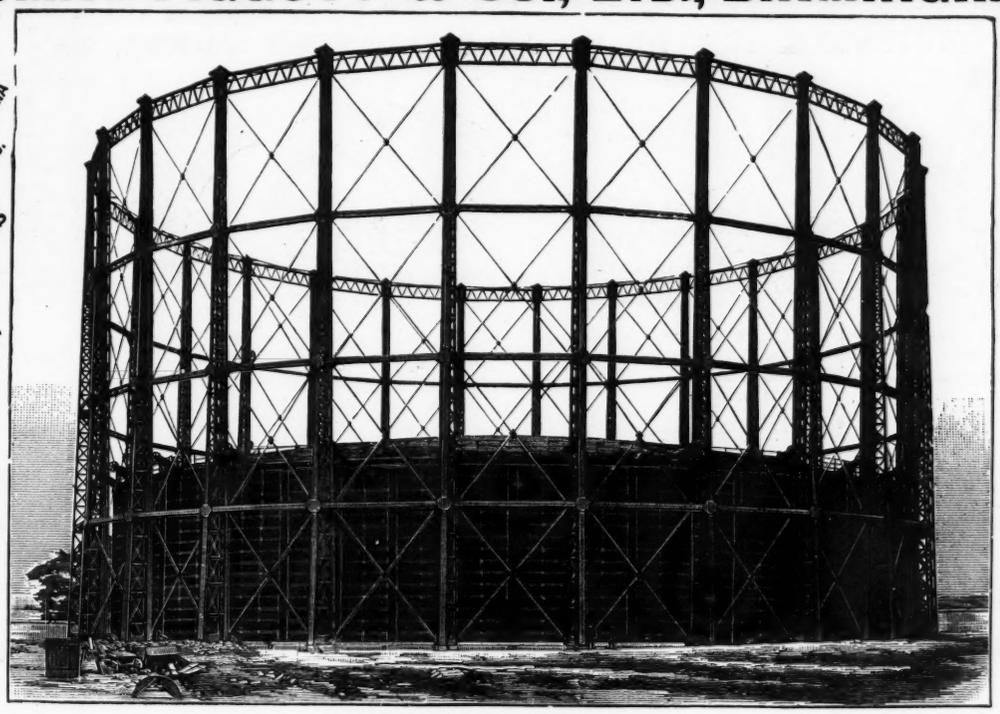

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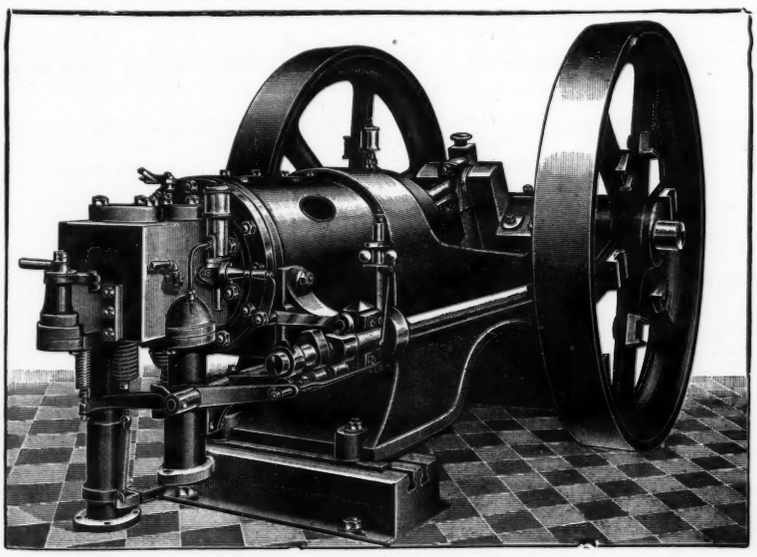

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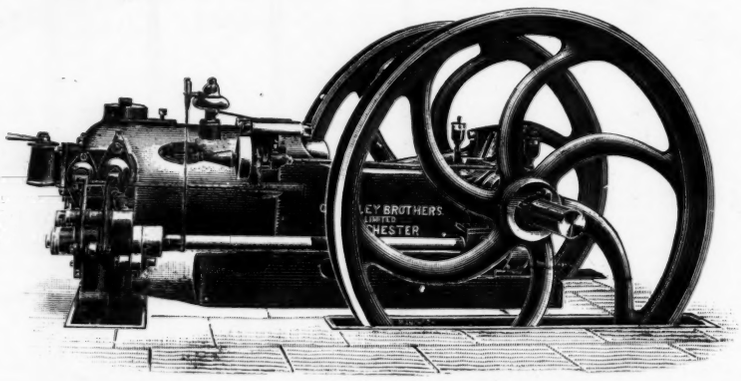

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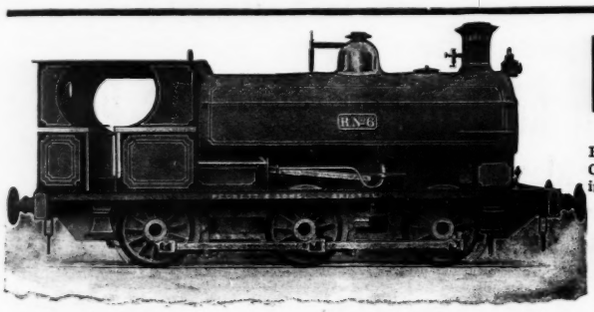

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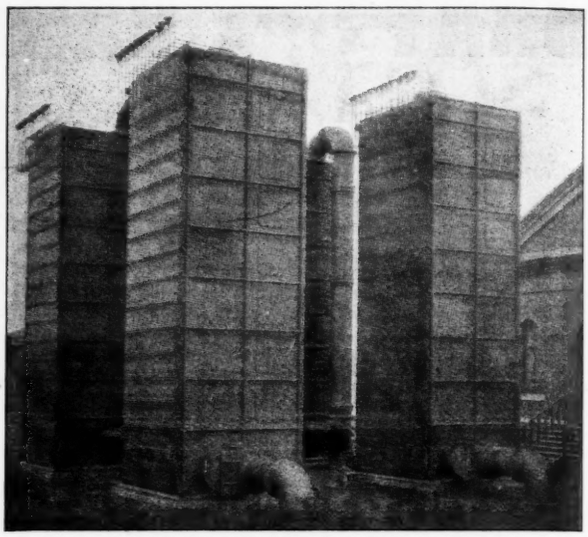

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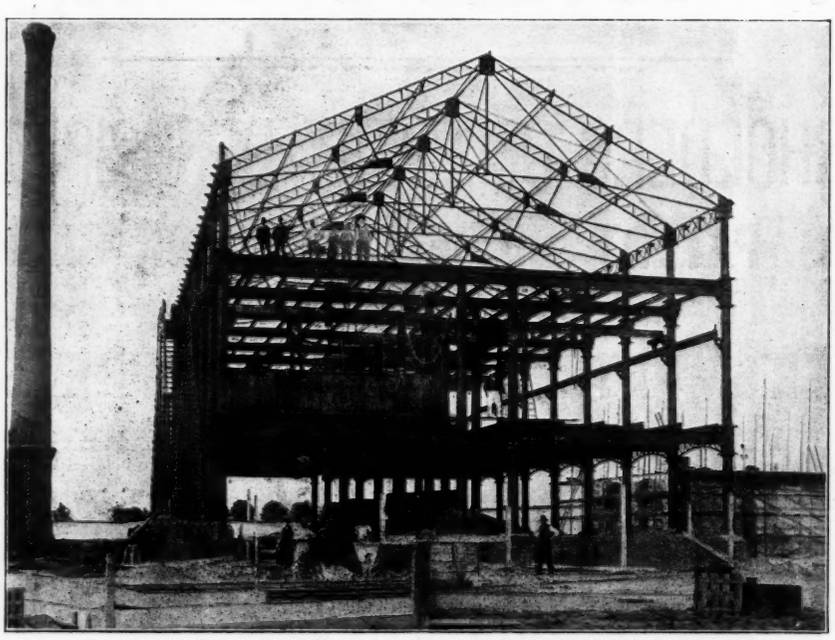

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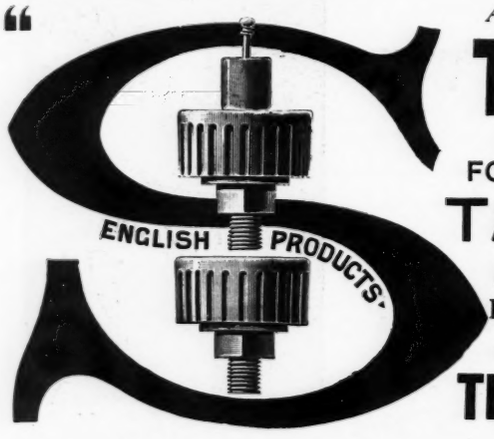

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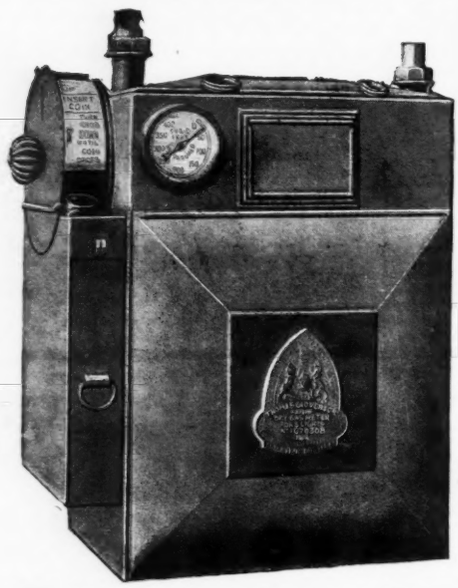

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EDITORIAL NOTES—GAS, &c.

Topics at the South Metropolitan Meeting.

THE meeting of the South Metropolitan Gas Company on Wednesday was well attended—possibly because, as the Chairman, Sir George Livesey, explained, orders for admission had been sent out to the members of the local governing bodies in the Company's extensive district. There was also a strong contingent of workmen-shareholders present. Through the force of circumstances, the interest of the proceedings was under, rather than upon, the surface of the speeches. There was nothing in the immediate condition of the Company's affairs to call for much detailed explanation from the Chair; and accordingly Sir George Livesey devoted the greater part of his speech to one of those historical surveys of the whole state of the Metropolitan Gas Industry which he does so well, from his own knowledge and experience of the facts. It is unnecessary to repeat any of this chronicle here; but the attention of those whom it may concern may be directed to the report which appears in another column. Otherwise, the Chairman spoke about the rates; the success of the co-partnership system; and the cause and effects of the reduction in the price of the Company's gas. In all this there was very little indeed to excite comment, to say nothing of controversy.

In describing the main interest of these proceedings as lying underneath the surface, we had special regard to the questions that were put and answered as to the success of the Company's policy of raising the fresh capital required from the consumers and employees. It was stated that the latest issue of stock has gone very well indeed; no difficulty being experienced in obtaining from the consumers as many subscriptions as are wanted at the price of issue, which we believe is 121—quite the top quotation for the time being. From a casual observation made, it is to be gathered that the Stock Exchange has been completely defeated in the attempt, if one were made, to obtain control of this issue. A fair price is being willingly paid for a good investment; and no middleman has a finger in the pie. This state of affairs, no doubt, is bad for the gentlemen of the City, who have been accustomed to take heavy toll of all stock issues in the past. They have deemed themselves entitled to this plunder, as of right; and probably to this day "operators" on other people's property for their own advantage curse the name of Livesey whenever they remember it. But they only have themselves to thank for the simple expedient which has left them out in the cold as regards the capital issues of the South Metropolitan Gas Company, and of many municipalities which have since adopted the same system of procuring capital in small subscriptions. For some time it was made evident that the publication proviso of the auction clauses was being abused by the too-clever chiefs of the investment market. It became a commonplace that an announcement of an intended stock issue mysteriously depreciated the value of any company's stock in the market; so that the practical effect of the auction clauses was that of taxing the undertaking for the benefit of the dealers, which was certainly not the intention of the Legislature when imposing these conditions of issue. Not being the man to take this kind of thing "lying down," Mr. George Livesey, as he was then, had the happy idea of obeying the letter of the law in a way that did not give the Stock Exchange marauders the information necessary for their operations. The advertisements of the new issues of South Metropolitan stock were given to obscure local newspapers; so as to outwit the "pirates" until such time as the Company's Acts of Parliament could be amended in accordance with the proved necessities of the case.

Of course, the wiseacres of the London County Council opposed this idea of raising capital locally, as they oppose everything else that looks like an endeavour to deliver the gas industry from harmful restrictions. But before long they were fain to copy it—also as usual, when somebody else has proved the real excellence of a new administrative expedient. Nowadays, many local authorities are dispensing with the Stock Exchanges, and dealing direct with the multitudinous small investor. This is so eminently the right and proper thing to do, that one wonders it has not been done to a much greater extent, and long ago. There is, however, a danger in this class of finance that was fairly and squarely unmasked by Sir George Livesey on Wednesday. It is the risk of the small holder taking alarm at depressions in the market quotation for his holding, and thinking that a fall in the listed value to the extent of 10 or 20 per cent., or whatever may be the figure, means so much loss to him. This is not so. What the real investor buys in the shape of stocks or shares is the right to so much income as the purchase represents. As long as the return does not decrease, and he does not want to realize, the list quotation applying to it from day to day does not affect him. It does not spring from any consideration arising out of the nature of his property at all, but merely signifies the existence of a general state of affairs in the Money Market from which, as a matter of fact, he is absolutely shielded. His proper course in such circumstances is to increase his holding, if possible. Wise men buy when prices are low, whereas at such times those who are not wise are apt to sell. Not even when the returns fall somewhat is it prudent to change the investment. It is because small, and inexperienced, investors do not share these convictions, which belong to the financial conscience of large and successful capitalists, that their money is not coveted by the administrators of fluctuating concerns. The former order of capitalists must learn by assurance from others whom they can trust—like the Chairman and Directors of the South Metropolitan Gas Company—that these nominal fluctuations of the list values of stocks belong to the scheme of things financial, and must therefore be accepted. Eventually they will know the truth by experience, and then they will laugh at their own early nervousness.

Another point of gas company finance, as to which a "little knowledge" prompted an inquiry at the South Metropolitan meeting, was also satisfactorily dealt with from the Chair. Some proprietor had observed that banks and discount houses have written down the value of their reserve investments; and he wanted to know if the Company had done likewise. It was easy to dispose of this querist; but the statement in point was well worth the publicity of the occasion. A gas company's reserves are not of the same nature and service as those of a bank, which might be compelled to convert them into cash at an hour's notice. The reserve fund of a gas company is intended primarily to equalize dividends; and meanwhile it can very well be employed in the business, to spare working capital. In the circumstances, therefore, the fairest plan is to keep all the reserve investments of the Company in the books at their cost value, which by the nature of the case generally works out at a fair average, taking one time with another, without entailing the troublesome operation of writing up or down. Having regard to this class of the subjects ventilated at the South Metropolitan meeting, the proceedings must be regarded as of considerable moment.

The Crystal Palace Gas Company and their Bill.

As at the South Metropolitan Company's meeting, so at that of the Crystal Palace Gas Company, many matters were unfolded to the view of the proprietors by Sir George Livesey, and some of them were above the commonplace. The Chairman was not in a combative mood—not even when speaking of the heavy charge incurred in the struggle to carry through Parliament last session the measure promoted for greater freedom for the Company, and, through them, for the British gas industry at large. Only once did he let the lash fall, and that was on a member of the Parliamentary Bar who, in the course of the Committee proceedings last year, had the "audacity" to describe the purposes of the Bill as being wholly in the Company's favour, with nothing to the advantage of the consumers. Sir George

showed that the boot was on the other leg—that at least six-sevenths of the resulting benefits would go to the consumers. He covered his points with brevity and clearness, both on the working of the past half year and in connection with the fresh attempt to be made to enlarge the range and stimulate gas legislation with an Act on much the same lines as the Bill which was so notable a feature of last session.

It is a matter on which the Company are to be felicitated that the past half year has been to them so financially prosperous that it was able to bear the heavy burden of last year's fight in Parliament, and yet leave a largely increased balance to be carried forward. On this happy condition of affairs, a reduction in the price of gas has been made from the beginning of the current quarter. There is, therefore, the prospect of the proprietors receiving the full dividend of 5½ per cent. to which they will be entitled at the end of the present half year, and the employees an addition to their bonus. Here the triple partnership existing in the case of this and two larger Gas Companies is exemplified. But, as a matter of fact, the consumers are the most fortunate of the triad; for they are already enjoying the reduction—they have the bird in the hand, while the increased dividend and bonus are still in the bush. The consumers should bear in mind that they have had to find the £3300 which was spent last half year in parliamentary charges, and will also have to find again and again, until the Company obtain relief from the present useless restraint, the money that must be spent in fighting obstinate obstruction. We hope that the present Bill will not be sacrificed to this Moloch. Such sacrifice simply finds its end in the consumers being cheated—and by their own representatives—of the reduction to which they are fairly entitled.

The Bill that is being promoted this year (and to which the proprietors gave their unqualified approval on Friday) proposes, among other things, the supply of gas of a standard quality of 12 candles; the abrogation, so far as the Company are concerned, of the sulphur clauses; and another endeavour is going to be made to bring the supply of electricity by the Local Authority of Beckenham under the operation of the Bermondsey clause. There is quite sufficient novelty here to make the Bill, for the gas industry, the feature of the coming session; but this is not the time to discuss the points. The Company have dropped a candle in illuminating power below the proposal of last session. The "reason" for adopting 12 candles given by Sir George, that the Directors were bound "to insert something," will be read with amusement. In this his unmitigated contempt for nominal illuminating powers in these days is painted as vividly as it can well be. For our part, we hope that a display of ineptitude such as was witnessed in the Committee-room of the House of Lords last session will not occur again in this one; and that the verdict of the House of Commons Committee on the Bill of 1903 will be that of both Houses on that of 1904.

The Affairs of the Commercial Gas Company.

The report of the Directors and the accounts of the Commercial Gas Company for the past half year will be found in another column. They indicate that there was a profit of £62,684 on revenue account, to which there was to be added a carry-forward of £16,509. After providing for the interest payable, there remains a net profit balance available for distribution of £70,997. Out of this the Directors recommend the payment of dividends at the rate of £5 4s. per cent. per annum on the 4 per cent. stock of the Company, and of 5 per cent. per annum on the 3½ per cent. stock. A year ago the net balance available for dividend was £62,388; and the rates of dividend paid were 5 and 4¾ per cent. respectively. The circumstances of the undertaking have therefore improved in the twelve months. The revenue account shows an increase in the cost of gas manufacture from £134,175 to £140,007. Raw materials cost slightly less; but a considerable increase occurs in the amount charged for repairs and maintenance. Distribution, also, ran into more expense, chiefly under the same head. On the whole, the expenditure on revenue account increased from £172,705 to £182,113. The receipts are not quite comparable with those for the corresponding half of 1902, because of the reduction in price; but, even so, gas brought in £177,232, against £178,865. It is to be remarked that this time the receipts for gas are marked by the deduction of "discounts and allowances." The receipts from rentals of stoves and meters show a gratifying increase from £10,849 to £13,335. Residuals, as in the cases of the other London Gas Companies, have improved. It must be a source of satisfaction to the Company that the demand for gas in their confined district, which once showed signs of having reached the point of saturation, now continues to grow. True, the sales for public lighting exhibit a falling off, which is due to the principal Local Authorities being badly bitten with the electric light craze. They will feel themselves "bitten" in another sense shortly, if they do not at the present time. Meanwhile the private consumption of gas has increased by 91¼ million cubic feet—a really wonderful rise, having regard to the class of population catered for. The Chairman of the Company, Mr. W. G. Bradshaw, may be expected to make some interesting comments on the development of the undertaking.

Strikers in the Law Courts—Men and Trade Unions Cast in Damages.

The cause of good and peaceable government must be regarded as having gained enormously during the last few years, from the series of judicial decisions that have brought financial responsibility for unlawful damage done by strikes home to all the Trade Unions instrumental in originating or carrying on these industrial outbreaks. The vapourings of the labour agitators, who had succeeded in persuading themselves and their dupes among the working-class population that things done in the name of Trade Unionism were superior to the law of the land, will now cease from troubling the course of employment. Two recent examples of the vindication of the law in this respect call for record. One was the case of the Risca Colliery proprietors against 150 of their workmen who had absented themselves from work without notice. The Company claimed £3 per head as damages, and recovered the full amount, with £50 costs. The other case was that of the suit brought by the Denaby and Cadeby Main Colliery Company against the Yorkshire Miners' Association and a number of trustees, officers, and agents of the Association, to recover £125,000 as special damages for having, by wrongful and illegal means, procured the plaintiffs' men to go out on strike. The trial lasted ten days, and resulted in a verdict for the Company, the question of damages being reserved. Both directly and consequentially, the case was of the first importance; the Judge who tried it remarking that not one moment of the prolonged time occupied in disposing of it had been lost. Yet the real issue was very short and quite simple; being nothing more nor less than the question whether the men who admittedly broke their contracts of employment by going out on strike without previously giving notice were "procured" to do so by agents of the Association, acting as such, and the action being ratified by the Association. The Special Jury answered in the affirmative all the questions bearing upon this point; and they also found that the Association maintained the strike by unlawful means, including molestation and intimidation, prevention of work by willing men, and the grant of strike pay against the rules of the Association itself. In concluding his summing up, the Judge made a general observation on the whole sordid, miserable story, which ought to be posted up wherever Trade Unionists do congregate. The words were as follow: "It was a pity "that, in a matter of this kind, some person on the part of "the Union had not the moral courage to stand up and say "boldly to the men that when they entered into a contract "they must abide by it, and that when they appealed to the "law they ought to abide by the decision of that law." This is straight to the point; for pandering to the disaffection of rebellious workmen, seduced in the first place by agitators as ignorant as themselves, has been the besetting weakness of Trade Unionism everywhere.

The Lighting-Back of Incandescent Burners.

According to a newspaper report of a Coroner's inquest at Westminster last week, a statement was made by a Dr. Edmunds, police-surgeon, to the effect that there is a certain measure of danger in using incandescent gas-burners, "for they often ran down, and when the flame was at the "bottom, a considerable quantity of carbonic oxide might be "formed." It is as well to know all that there is to be said against the use of any form of gas appliance, on the score of either public safety or sanitation; and Dr. Edmunds, of

Westminster, was doubtless well within his right in drawing attention to a matter of positive scientific fact. No doubt, when a bunsen gas-burner lights back, the imperfect combustion of gas ensuing is not only productive of unpleasant fumes, but when the products escape into an unventilated interior, they may be dangerous in proportion to the poisonous gases they contain. Carbon monoxide is one of the products in question, though the quantity of it liable to occur in the circumstances mentioned has not, to our knowledge, been measured. Some light upon this question was shed by the observations of Dr. Chikashigé and Mr. Matsumoto in their paper at the Society of Chemical Industry which was summarized in the "JOURNAL" for the 12th ult. (p. 89). It is not worth while to speculate as to what might or might not happen in the case of any particular make of lighting gas, supposing the incandescent burner using it were to light-back. It is more to the point to guard against the risk of this happening, by discouraging the use by consumers of burners likely to exhibit the weakness, and by seeing to the regular cleansing of those actually in service. It is well known that the clogging of the gauze of the ordinary make of incandescent burner by dust renders it liable to fire-back. Indeed, for whatsoever purpose bunsen burners are employed, whether for lighting or heating, they require periodical cleaning and looking after. The keeping up of a good gas pressure is another necessity for the proper functioning of bunsen burners. To persons possessed of a normal sense of smell, to say nothing of eyesight, the fact of an atmospheric gas-burner being alight at the nipple proclaims itself unmistakably; but experience proves that the sensitiveness of people to the acrid smell of imperfectly burnt gas varies very considerably. There is sufficient reason for believing that some gas-fitters, from having their clothing and hands permanently "gassy," are even unable to smell escaping or partially burnt gas at all. Men so constituted ought never to be employed on stove or burner work in consumers' houses. It may therefore be found desirable to submit to a special examination candidates for this employment; for it is manifestly courting disaster to send on inspection work into consumers' houses men who, whatever their other qualifications, have no "nose" for gas. This faculty, be it observed, has nothing to do with use and wont; for it is quite common to meet with gas managers in whom no amount of experience can mask the smell of gas or of a bad burner.

American Steel Workers as Stockholders.

A READER of the "JOURNAL" has sent from New York a newspaper cutting relating to the experience of the United States Steel Corporation in the matter of their workmen's stock-holding scheme. This he thinks may be of interest to English readers, for the light it sheds upon the results of an experiment instituted in order to test the aptitude of the average wage-earner to pass by a convenient private door, opened for his special benefit, into the superior status of a partner in the firm. We use the word "instituted" advisedly in this connection, because the experiment is still in progress, and, in the opinion of the management, must be persisted in so long as any use is made of the opportunity. Speaking generally, however, and for about half the number of the workpeople of the Steel Corporation, the newspaper to hand—the "New York Times"—regards the adverse criticism of Mr. Carnegie as having been vindicated. Out of nearly 28,000 wage-earners who subscribed for the preferred stock of the Corporation at the price for the year 1903, which was $82·50 per share, it is reported that between 12,000 and 15,000 have requested the Finance Committee to cancel their subscriptions, and return the money paid on account. This has been done in every case; and it is not believed that many are reinvesting at the lower price fixed for the current year, which is $55. It must be understood that this employees' stock is not given to them gratis. It is allotted to the subscribers for monthly payments, collected by the Corporation; and in some instances the excuse given for cancelling the bargain was that, with lower wages and less continuous employment, the subscribers do not feel that they can meet the tax upon their earnings for the payments called for in their agreements. It is believed, however, that by far the greater number have been alarmed at the shrinkage in the value of their investment, which, it is pointed out, costs them nothing, inasmuch as the preference dividend has not been reduced or postponed.

What is happening is regarded as confirming "the conviction which most manufacturers share, that the wage-earner is a poor stockholder. Even when guaranteed against loss, and kept faith with in every respect, he is too timid to face a shrinkage in values with equanimity; and to get his money back he will sacrifice every advantage, present and prospective." This only applies to the case of workpeople in the mass, who are treated ministerially in a different way from all other investors. When coddled, the workman is thought to part with his independence of judgment, becomes a ward of his employers, and does not learn to survey fluctuations of quotation apart from the product of the investment. If stock were given him at a time when it had a market value of 100, and it subsequently declined to (say) 50, the chances are, according to this pessimistic view, that the workman would make haste to sell, and feel, when the transaction was concluded, that he had been wronged by the amount of the shrinkage.

The broad conclusion arrived at is that the idea of giving employees special consideration and facility to become stockholders in the company which employs them does not answer. It is therefore said of the workman that "he is happier, if not better off, when he is required to stand on the same plane as everyone else in the matter of investments, and very few of those who have risen above the wage-earning condition owe their advancement to special favours." The special favours referred to are, of course, those which the employer may think fit to offer in his ministerial capacity. This is the unmitigated doctrine of *laissez faire* in all its nakedness. No other advantages but those dispensed by Providence and offered by circumstances are permissible within the high and holy place whence this dogma is promulgated, which is the headquarters of the "New York Times," if not of the United States Steel Corporation. One is tempted to ask whether neither of these concerns owes its success to any mundane advantage—a Tariff, for instance, or the possession of a round capital sum in cash. Besides, the fact of half of a batch of profit-sharers withdrawing their bonus, or their investment, after the first year's trial, is no evidence of the failure of the scheme; and it is certainly not to be used against the rest. The South Metropolitan Gas Company had to go through this stage, and did not lose heart. The Steel Corporation should attentively study this record, and not suddenly grow weary of well-doing in deference to a few ancient prejudices.

Professional Advisers and their Fees.

Disputes between professional men and those who avail themselves of their services, in regard to the justness or otherwise of the fees charged for the assistance rendered, are always very troublesome matters to adjust; and when the aid of the Courts has to be called in, the amount in question not unfrequently sinks into insignificance in comparison with the expense involved in the attempt to recover it. In these as in other cases, it is sometimes better policy to "cut the loss"—in other words, to forego the amount over which the difficulty arose—than risk an adverse decision. Such a course, however, is at times not only unadvisable, but absolutely harmful, inasmuch as it may be taken as a precedent worthy of being followed in other cases, to the lowering of professional status, and the detriment of the *esprit de corps* which it is so desirable to maintain. For this reason, we think the engineering profession have cause to thank Mr. Charles Hawksley and his co-defendants in the action which came before the Court of Appeal on Wednesday, as reported in another part of the "JOURNAL." Mr. Hawksley and Mr. Mansergh were the Arbitrators in connection with the transfer of the undertaking of the Llandrindod Wells Water Company to the District Council; and they appointed Sir George Bruce as Umpire. The fees of these gentlemen amounted to £476 12s.; and the Council, who had to pay them, thought they were high, and had them taxed. The Taxing Master applied for particulars, which were refused. He, however, obtained certain information that led him to disallow £119 5s. The matter came before Mr. Justice Ridley, who, notwithstanding the evidence given by Sir Frederick Bramwell, Mr. Corbet Woodall, and others, in justification of the charges, supported the decision of the Master, except in the matter of altering pounds into guineas as the amount of the fee per day to which each of the defendants was entitled. This brought the

disallowance down to £102 7s. 6d., which the Company claimed to have refunded to them. Mr. Lawson Walton contended that the only ground on which they could recover was that the charges were extortionate, which was negatived by the evidence. This was the view taken by the Master of the Rolls and Lords Justices Romer and Mathew, who unanimously allowed the appeal, with costs against the Company. It was sought to be shown that fees charged by Arbitrators are subject to taxation or revision. But this contention was set aside; and the defendants were commended for declining to acknowledge the authority of the Taxing Master by furnishing the particulars applied for by him. In fact, the Court was with them all through; and they gained an easy victory.

Councillors and Ratepayers.

It seems a little remarkable that, in spite of a resolution being formally placed before them in favour of gas, which had been passed practically unanimously at a meeting of ratepayers, the Windsor Town Council should have decided *nem. con.* to accept the tender of the Electricity Company for the public lighting of the town. In a place the size of Windsor, a meeting of 200 ratepayers should be fairly representative; and an opinion acquiesced in by 99 per cent. of those present is therefore entitled to some consideration by their representatives on the Council. This, however, it did not get; and the ratepayers have a clear right to ask the reason why. It is true that the meeting was only held at the last moment; but as the resolution was read to the Council before the vote was taken on the question, it was not too late for the members to have acted in accordance therewith, had they chosen to do so. But their Committee, after having had the matter referred back to them at the previous meeting, had again recommended the acceptance of the Electricity Company's tender; and apparently the councillors generally felt bound on the second occasion to support this finding. Thus Windsor, presumably in opposition to the wishes of the majority of those who will be called upon to foot the bill, is committed to a system of public lighting which provides for a total candle power illumination in one half-mile of streets greater than that which is to be spread over the other 12½ miles. This, of course, is a scheme such as electricians love; but how it can commend itself to anyone besides them—and possibly some of those who live within the favoured half-mile—is a mystery. And for such a one-sided arrangement as this, the townspeople will have to pay a considerably higher price than the Gas Company would have charged for a more equally divided system of lighting. Instead of being for five years certain, as was first of all intended, the contract is to be determinable at the end of two years at the Corporation's option; and the ratepayers should see to it that this option is exercised—which will secure to them a reduction of 1d. per pound in the rates and a very much fairer distribution of light. Whether or not, as was stated at the public meeting, the Electric Light Company have enjoyed favouritism from beginning to end, and the contract was settled by twelve councillors eleven of whom had an arc lamp near their premises (the one excepted not having been a member of the Council for many hours), the decision of the Council does not appear to be for the good of the greatest number. The efficient lighting of the side streets is equally as important as that of the main thoroughfares; but under the scheme adopted, they will have to be content with lamps of 32-candle power, instead of the 70-candle ones which the Gas Company proposed to provide.

Some Figures from Cardiff

There is the less reason for the course decided on at Windsor, seeing that the electricity supply is not in the hands of the Local Authority. Where this is the case, of course, somewhat different considerations may arise. At Cardiff, for instance, when supporting a proposal to largely extend the electric street lighting, the Chairman of the Committee said "the Council had their own electricity for sale." This explains a good deal—and it must be admitted that in this case there is room for explanation, in view of the fact that the lighting bill is increasing at the rate of about £1000 a year. Another (and far less convincing) reason advanced by the Chairman in favour of the suggested extension of electricity was that "though the cost of electric lighting would be over five times as much as gas, the amount of candle power obtained would be 86,250, as compared with 3204." The relative cost is no doubt about right; but the figures in regard to candle power are sufficient to make one rub one's eyes, and it would be interesting to learn just how they were arrived at. To take gas at its worst—*i.e.*, in flat-flame burners—and electricity at the very best that can be claimed for it, would not be fair; but this is surely what must have been done to secure anything within thousands of candles of the result stated. In such a comparison gas, too, should be taken at its best—that is, when used with an incandescent mantle; and if this were done, a very different state of affairs would be revealed, in spite of the moderate price of £14 per annum which is put upon the 750-candle arc lamps at Cardiff. We are pleased to see that the statement referred to has not been allowed to pass altogether unnoticed; for Mr. A. R. Browning, of Neath, has taken the matter up, and demonstrated in the columns of the local Press what the self-intensifying incandescent gas system is capable of doing. Though they may not always cause much harm, it is best that errors like this should be pointed out; and gas managers are well able to undertake the task.

And Ilkeston.

While dealing with the subject of gas and electricity costs, there is another fact of which readers may make a note, for use when occasion requires. Last week, when recording the decision of the Ilkeston Town Council to discontinue the use of incandescent electric lamps in the streets, and employ incandescent gas-lamps in their place, it was stated that the former had been found to be twice as expensive as the latter. This proves, however, to have been very much under the mark, for a correcting letter in a local paper points out that the electric incandescent lamps cost ¾d. per hour each and the arc lamps 1½d.; while inasmuch as the incandescent gas-lamps consume only 2½ cubic feet per hour, it is possible to have quite a large number of them—sixteen, the writer of the letter says—each giving a more brilliant illumination, for the price of one electric lamp. There is no complicated question of candle power involved here. It is a simple, straightforward statement of fact. And the significance of the fact is not decreased when one bears in mind that the electricity undertaking and the gas-works are both the property of the Town Council.

Mantles and the Wrongful Use of Trade Names.

It was only a fortnight since that comment was made in the "JOURNAL" on the action of the Commissioners of Customs in insisting on the stamping of imported mantles (and not the boxes or labels as has been customary), with the name of the country from which they were exported. The authorities were largely instigated to this move by the deception that has been practised on the public by the reboxing or relabelling of "cheap and nasty" importations to imitate the coverings of the wares of makers and traders of good repute in this country. A firm dealing in mantles in Newcastle have lately been brought to book—not for this particular disreputable proceeding—but for making a foolish and unwarrantable use in an advertisement of the title "Veritas" and "Ram." The registered proprietors of the "Veritas" mantle are, as is known the gas industry through, Messrs. Falk, Stadelmann, and Co.; and they also use the word "Ram" in connection with other mantles. The knowledge, however, of the gas industry is not that generally of the public. The mantles sold by the Newcastle firm were admittedly not purchased from Messrs. Falk, Stadelmann, and Co.; and consequently the former have had to publish an apology, to undertake not to employ in future in their advertisements the trade mark and trade names of "Veritas" and "Ram," and to offer a sum of £50 as damages and £10 10s. for legal costs. So long as the mantle trade is made the ground of deception, however indirect, every step possible will be taken by the firms and companies of high standing to stop the injury worked upon the public, the gas industry, and their own reputations. In this they should have, and must have, to obtain the greatest success, the support of all interested in retaining the pre-eminence of gas lighting.

A Flourishing Midland Gas Undertaking.

It must have been a source of keen regret to Mr. H. Swingler, the Chairman of the Derby Gas Company, that he was unable, owing to ill-health, to occupy his accustomed position on the

occasion of the meeting of shareholders on Friday, inasmuch as the past year was the most satisfactory one in the Company's existence. Those who are best acquainted with the working of the undertaking know how thoroughly devoted the Chairman is to its interests, and how his ability and business capacity have been unsparingly employed in its service. Nothing, we are sure, would have given him greater pleasure than to dwell upon the features of the past year's operations which contributed to the success achieved. Dealing first with raw material, there was a saving of £2576 on coal; and allied to this there was an increase in the revenue from residual products—sulphate of ammonia having gone up from £3146 in 1901 to £4913 in 1903, or an increase of 50 per cent. in two years. There was a rise of 10 million cubic feet in the quantity of gas sold; nearly 6 per cent. being in the second half of the year. This is accounted for by the progressive policy of the Company. For some eighteen months they have sold gas-engines on the hire-purchase system, and the arrangement has been a great success. The naphthalene trouble has greatly afflicted Derby; but Mr. J. Ferguson Bell, the Company's Engineer, has, by his process, entirely cured the evil. The result has been that, instead of having complaints by the hundred, they now average only one a day from some 23,000 consumers. The Chairman of the meeting (Colonel Gascoyne) suggested that the naphthalene question might be taken up by the Institution of Gas Engineers with advantage to the gas industry generally; and the suggestion is worth attention. Our readers are aware that the De Brouwer coal projector has been installed at one of the Company's works. It has been very successful; Mr. Bell having by its aid produced 12,300 cubic feet of gas per ton of coal—the average make being 11,800 cubic feet. The consumers have shared in the prosperity resulting from the good management of the undertaking, as shown by the reduction of 5d. per 1000 cubic feet to ordinary consumers and 11d. to power users in the past two years. Notwithstanding this, the profit last year was the greatest on record. This shows what can be done by enterprise.

The Amending of Tenders.

A protest has been made in the Southport Town Council against a practice which has been found by them to have become increasingly common, and which, if allowed to pass unnoticed, might greatly interfere with the fairness of the existing system of tendering for contracts. What is complained of is the habit developed by tenderers, on finding they are the lowest on the list, of stating that a mistake had been made in their calculations, and trying on this plea to secure an addition to their quotation which would bring it nearly, but not quite, up to that of the next lowest firm. The amount involved in the case which gave rise to this protest was a very small one—some few pounds only, for repairs to a roof. But it was evidently felt that the time had come for making an example; and therefore the tender which had originally been accepted, and to amend which leave had afterwards been asked, was rejected, and the one standing next on the list was adopted in its place—though the first-named tender, even after the amendment which was desired, would still have been the lowest by a few shillings. Of course, it is quite possible that there really had been a mistake made in the calculation, as alleged; for it is difficult to understand on any other basis than that errors of this kind do arise, some of the wide tendering that is of so frequent occurrence. But at the same time the practice of allowing an amendment of an offer after it has once been accepted, is not one to be encouraged without very good reason for it being shown; and the course which the Southport Town Council have taken should be sufficient, in their case at any rate, to put an end to such applications. We are quite willing to believe that there was a good deal of exaggeration in the statement of one of the councillors that "in nineteen cases out of twenty the only mistake a contractor makes is that he finds out afterwards he might have quoted so much more if he had known what the other competitors were going to fill up their tenders at." The remark, however, indicates just where the danger lies in permitting, without due inquiry, the amendment of tenders after they have once been submitted for acceptance; and the Southport Town Council are not to be blamed for doing what they can to guard against the possibility of such an abuse of the contract system, as the course of action of which complaint was made might lead to.

WATER AFFAIRS.

Progress of the Metropolitan Water Arbitration.

THE case of the Chelsea Water Company, with which the Arbitrators under the Metropolis Water Act, 1902, were occupied last week, presented less difficulty than those which had preceded it. The original claim was for £4,750,000; and the offer of the Water Board was £3,000,000 less. The case for the Company was opened by Sir Edward Clarke, who at the close of his address stated that their total claim amounted to £4,919,113. They asked for 10 per cent. in perpetuity on the share capital of £1,092,965, and such sum as should be found necessary to make up any deficiency that might have occurred in any year in that dividend. There was no question as to sterilization clauses in this case; and though there is a sinking fund, it affects only a small amount. Curiously enough, the quality of the water was not impeached. The necessary financial and engineering evidence having been given in support of the claim, Mr. Fletcher Moulton contested the Company's right to compensation for any deficiency in back-dividends on all the capital, inasmuch as the rate on the preference shares had been prescribed and paid; and therefore it was only in respect of the ordinary capital, where there had been no prescription, that arrears could be asked for. Sir Edward Clarke, in reply, said that if the Arbitrators upheld this contention, the £934,000 claimed on account of back-dividends would have to be reduced by £269,000. He submitted, however, that it would be reasonable to interpret the Act of Parliament so as to give the undertakers 10 per cent. on the total paid-up capital, and leave them to deal with it as they thought fit. The Arbitrators decided this point at once, and held that the Company were only entitled to 10 per cent. on the ordinary capital, and 5 and 4½ per cent. respectively on the two classes of preference shares. This decision, which was given on Thursday, practically brought the Arbitrators' work to a close for the week, as they shortly afterwards adjourned till yesterday, when the case was finished.

The reason for not sitting on Friday was the engagement of Counsel in arguing before the Court of Appeal the points of law reserved in the cases of the awards already made; the first being as to the liability of certain of the Water Companies to contribute to the Chamberlain of London's sinking fund, the purpose of which is well known to all who have followed the Metropolitan Water Question. The matter was argued on the appeal of the East London Company against the decision of the Arbitrators in their case; and it was in the able hands of Mr. Balfour Browne and Mr. C. A. Cripps. The sum paid by the Company into the fund amounts to £34,281, and it has been invested in the Company's stock—the holder (the Chamberlain) drawing the dividends. In the year 1902, the accounts for which have been taken for the purposes of the arbitration, £5750 was deducted from the amount divisible among the proprietors, and paid to the Chamberlain, while £107,000 was distributed as dividends. The question for the Court was whether the latter sum only or £112,750—the total produce of the undertaking—should be used as the basis for capitalization purposes. Counsel contended that the £5750 was simply an allocation out of profits, and that the Water Board were purchasing an undertaking which produced this amount and £107,000 besides. The liability was purely temporary, and would be abolished on the transfer of the undertaking to the Board; and therefore the Company should not be treated as though it were permanent. Counsel, however, failed to convince their Lordships that the Arbitrators were wrong; and the appeal was unanimously dismissed without troubling Mr. Fletcher Moulton to reply to the arguments.

It will be seen, from the report of the judgments which appears elsewhere, that the Master of the Rolls laid it down emphatically that Parliament had provided that when the Board purchased the water undertakings which were liable to the contribution to the sinking fund, they were not to acquire them subject to this charge. It was a burden which had been imposed for the public benefit; and when somebody, representing the public, stepped in as purchaser, he was not to continue under the burden. The fact that the purchaser acquired the undertaking relieved of the obligation imposed upon it, could not, in his Lordship's opinion, be used in support of an argument for paying something to the person from whom the purchase was made. Lord Justice Romer

thought it impossible to hold, on the wording of the Act of Parliament, that the intention of the Legislature was to compensate the Company for anything more than what they had to sell, and that was an undertaking subject to a certain outgoing created by former Acts. It was never intended to treat that outgoing as having been imposed for the benefit of the sellers. Lord Justice Mathew expressed a similar opinion. A question arose as to the costs in the appeal, which Mr. Balfour Browne thought should be borne by the Water Board. But the Master of the Rolls said the appeal was a "luxury" added to the arbitration; and therefore the Company must pay for it.

The decision of the Arbitrators, which has been so strongly supported by the Court of Appeal, seems to us to be absolutely just, and to entirely carry out the intentions of Parliament in inserting the sinking-fund clause in the Company's Acts. The effect was to prevent any additional value accruing to the undertaking from new loan capital; and to withdraw from the divisible profits a certain sum for the benefit of a possible future purchaser representing the public. A similar clause has been inserted in every Water Company's Act since 1886; and it was pointed out in the report of Lord Llandaff's Commission that if the obligation thereby imposed were not removed by the Act authorizing the purchase, the arbitrator would have to "exclude from his valuation in all cases the payments that "the Companies, if they continued to exist, would have to "make to the Chamberlain's fund." This is just what the Arbitrators have done, and, in the opinion of the Court of Appeal, rightly. Mr. Balfour Browne suggested the possibility of taking the matter to the House of Lords; but, for the present, the award stands at £3,900,000, in addition to the Company's debts, debenture stocks, rent-charges, and other matters. The same question arose in the cases of the New River and Grand Junction Companies; and the decision is therefore applicable to them. Other points in connection with the claim of the former Company will be argued to-morrow.

Midland Association of Gas Managers.—Next Thursday week the members will meet at the Grand Hotel, Birmingham, for their annual general meeting. Mr. Charles Meiklejohn, of Rugby, will be succeeded in the presidential chair by Mr. George Helps, of Nuneaton, whose Inaugural Address will, of course, be the feature of the occasion. In addition to the ordinary proceedings, the question of the affiliation of the District Associations with the Institution of Gas Engineers is to come under discussion; and Mr. Sidney O. Stephenson, of Tipton, will contribute a paper on "Gas-Fires."

Analyses of British Coals and Coke.—The proprietors of the "Colliery Guardian" have just issued the third part of the series of analyses of British coals and coke, which is appearing in the columns of that paper. In collecting the analyses, the object has been to classify them in districts over the coalfields of Great Britain; and they cannot fail to be of value to those connected with the trade. Part I., dealing with the fuels of Northumberland, Durham, and Yorkshire, has been published in French also. Part III. relates to Scotch, Welsh, Staffordshire, and Yorkshire coals, and includes analyses of Cumberland, Cheshire, and Derbyshire coals. The parts are published at 6d. each.

The Action of Benzene in Coal Gas.—In a paper "On the Part Played by Benzene in Poisoning by Coal Gas," recently read before the Royal Society by Dr. R. Staehelin, of Basle, he described a number of experiments on frogs, which led him to the following conclusions: (1) Coal gas produces first excitation and then rigor of the isolated frog's muscle. (2) Frogs exposed to coal gas show excitatory phenomena which are absent when the animal is placed in an atmosphere of carbon monoxide or nitrogen. (3) The specific effects of coal gas on frogs are determined by the presence of benzene in the gas, and can be produced by air containing the same percentage of benzene. (4) There is no reason to suppose that the poisonous effect of coal gas on mammals is determined by anything except its content in carbon monoxide.

Manchester Gas Committee and their Contracts.—It appears that the references made to the wages paid at Messrs. Gibbons's works, in the course of the recent debate in the Manchester City Council as to the placing of a tender for an installation of inclined retorts (which was reported in the "JOURNAL" last week, p. 353) have caused much annoyance to their employees. Resolutions on the subject have been passed by the workpeople in the various departments; and we have seen copies of these, as well as of the certificates of the firm's Auditors and of the Secretary to the Local Branch of the Operative Bricklayers' Society. Messrs. Gibbons are printing the whole of the matter in book form to issue to their clients. This will be interesting, not only on account of the refutation it affords to the allegation of unfair wages being paid, but also on account of the unusually long records of service (under one firm) shown in many instances and in every department.

RETIREMENT OF MR. WILLIAM KING.

FOR some little time, rumours have been in circulation as to the intended retirement of Mr. William King, the Engineer of the Liverpool United Gas Company; and at the half-yearly meeting to-day, the Chairman, Sir Edward Lawrence, may make an announcement to the shareholders which will prepare them for the severance, in the course of a few months, of a family connection with the undertaking which has extended over the entire term of its existence. The name borne by the present Engineer has been associated with the Liverpool Gas Company for 86 years—a period which is probably unique in the history of gas manufacture. In the year 1818, his uncle, Mr. Joseph King, was appointed one of the first Directors of the original Company; his name being mentioned in the Act of Parliament of that year under which the incorporation was effected. This position he resigned in 1822, when his brother, Mr. John King, was appointed Engineer. This gentleman died in 1826; and his brother, Mr. Alfred King, was chosen as his successor. He occupied the post until his death in 1867, when his son and assistant, the present Engineer, was entrusted with the more responsible duties. These he has discharged uninterruptedly ever since.

Mr. William King's early associations eminently fitted him for the position he was called to occupy. Born in Liverpool in 1839, he received his education at the Royal Institution School in the city, under the head-mastership of the Rev. Dawson W. Turner, M.A., D.C.L. There he had as schoolfellows Canon Robinson Duckworth, of Westminster, Sir Dyce Duckworth, M.D., the present Bishop of Ripon (Dr. Boyd Carpenter), Mr. Charles Booth, and others whose names have been associated with the events of our time. He entered the Company's service in 1856, and was trained under his father, whose Assistant he became in 1861, and six years afterwards, as already mentioned, his successor. He was elected a member of the Institution of Civil Engineers in 1874; and he is also a member of the Institution of Gas Engineers, the Institution of Mechanical Engineers, and the Liverpool Engineering Society, an honorary member of the American Gaslight Association, and an associate of the Surveyors' Institution. He was Vice-President and a Trustee of the Institution of Gas Engineers on its formation in 1891; and he held the latter office until its amalgamation with the Gas Institute. As our readers are aware, Mr. King is a member of the Committee recently appointed by the Board of Trade to inquire into the subject of the testing of London gas, who held their first sitting on Monday last week.

The severance of a connection which has existed so long between the members of Mr. King's family and the Liverpool Gas Company cannot, we are sure, be contemplated with ordinary feelings by those immediately concerned. But the time having come for it, we can only wish Mr. King—and we do it most cordially—many years' enjoyment of the comparative leisure he is now seeking, and the Company he and his relatives have so faithfully served a long continuance of the prosperity which that service has been largely instrumental in attaining.

THE PUBLIC LIGHTS OF LONDON.

(*Continued from p.* 329.)

THE article this week should be prefaced by first an explanation, and secondly by a modification, of statements made in the opening one. A correspondent writing with reference to the paragraph dealing with Battersea remarks: "By inference it might seem that, as the Wandsworth Gas Company supply the flat-flame lamps which come within their district in that borough, they are behind the times. The Company supply the whole of Wandsworth and that part of Putney within their area by incandescent burners, and offered to alter the small number of Battersea lamps to the incandescent system at cost price, and afterwards to maintain them at a rate which for gas and all charges would be considerably less than for the flat-flame burners. The offer, however, was rejected." The second matter touches upon the paragraph alluding to the City. An estimate of four mantles per lamp per annum was there referred to as a "liberal" allowance. This adjective is withdrawn. In writing, the experiences of one or two towns that appear to be specially favoured in respect of a low average use of mantles, were in mind; but, looking again into the matter, the average of four must be admitted to be too low, taking a wider view of general experience. Mr. S. Meunier, in his paper at the last meeting of the Manchester Institution, commenting upon some tabulated figures referring to this subject, remarked: "One is struck by the large differences in the number of mantles required annually. Of the 19 towns, the lowest is 2·75, and the highest 12 per burner, while the average is about 7·5." Again, "out of 136 lamps used in Stockport, the twelve best took 3·83 mantles per annum, and the twelve worst 15·5." Therefore, perhaps seven or eight mantles will be the average in the City. But, even then, there is a good margin in the costs per point between incandescent gas-lamps there and the old flat-flame lighting, to cover the extra expense for mantles.

Now continuing the individual treatment of the boroughs, and taking them in their alphabetical order, the next to be noticed is

Deptford.

Here we find a borough with a system of lighting that is quickly described. The area is about 1685 acres; and Mr. Thomas Corfield, the Surveyor to the Borough Council, is able to answer our questions as to the public lighting in about three lines. The whole district is illuminated by incandescent gas-lamps—1370 in all, 1157 of which are fitted with No. 2 burners, giving (Mr. Corfield computes) about 40-candle power each, and 213 with No. 4 burners, each emitting a light of something like 80 candles. The average cost of the lamps per annum (including maintenance) is £2 10s. for the No. 2 burners and £3 6s. for the No. 4 ones.

Finsbury.

In the district of the Borough Council of Finsbury (which covers some 589 acres), Mr. P. Gorringe Killick, the Borough Surveyor, reports that the only public electric lighting consists of two arc lamps over underground conveniences, for which lamps £33 each per annum is paid. This is quite a negligible quantity of electric lighting; and it is equally gratifying to learn that flat-flame gas-lights have been entirely displaced by incandescents. Finsbury is well lighted; there being a judicious use of cluster burnered lamps where the locality needs them. Altogether, there are 1749 incandescent lamps in the borough, of which 379 are clusters. There are 335 doubles, consuming 3¼ cubic feet per burner per hour; 15 doubles, consuming 4¼ cubic feet per burner; 7 3¼ cubic feet triplets; 3 4¼ cubic feet triplets; 18 3¼ cubic feet quads; and one 4¼ cubic feet quad. The burners in the last four classes are fitted with pilots. As to the 1370 single burners, 658 consume 3¼ cubic feet of gas per hour, 114 4¼ cubic feet, and 598 4¼ cubic feet and pilot. The average cost per burner, including lighting, cleaning, maintenance, and renewals, only works out to £2 19s. 6d. In supplying these interesting particulars, Mr. Killick remarks that "the whole of the lighting, cleaning, repairs, maintenance, &c., is carried out by the Council's own staff. The figure given as the average cost is the actual for the year ending March 31 last."

Fulham.

Though the information as to the character of the lighting in Fulham is disappointing, we are nevertheless not the less obliged to Mr. Francis Wood, Assoc.M.Inst.C.E., the Borough Engineer and Surveyor, for his ready response to the request for particulars. Fulham extends over an area of 1700 acres; and the Borough Council still control as many flat-flame gas-lamps as they do acres. There are 1754 of these lamps in use, each burning 5 cubic feet of gas an hour, and costing about £3 per annum. The remainder of the lighting is by 87 electric arc lamps, the average cost of which is £20 per annum. The Council possess their own electric lighting works. It may be hoped that it will not be long before Mr. Wood is able to report the conversion of the 1754 flat-flame gas-lamps—preferably to incandescent gas lighting.

Greenwich.

Mr. Ernest J. Heward, the Borough Engineer and Surveyor of Greenwich, is able to tersely sum up the methods of lighting the streets comprised in the 3851 acres under his care. The whole is by incandescent gas-lamps, to the number of 1723. Of these 1360 lamps are fitted with No. 2 burners; and the remainder comprise 346 No. 4 burners, and 17 cluster or obelisk lamps. All the lamps in the borough are maintained and lighted by the South Metropolitan Gas Company under contract—viz., £2 10s. for the No. 2 burners, and £3 3s. for the No. 4 ones.

Hackney.

The Borough Council of Hackney are the purveyors of electricity in their district; and the undertaking has received from time to time a large amount of publicity. But the possession of the electricity undertaking cannot be said to have distorted their judgment in the matter of public lighting; for, from the detailed explanation of the methods adopted to illuminate the streets kindly supplied by Mr. Norman Scorgie, M.Inst.C.E., the Borough Engineer, we find that the proportion of gas-lamps to electric lamps is about ten to one, or of incandescent gas-lamps quite eight to one. The borough has an area of 3300 acres; and in it are found 303 10-ampere electric arc lamps, 40 ½-ampere Nernst incandescent electric lamps, 2759 incandescent gas-lamps, and only 504 flat-flame gas-lamps. Out of the total of 3263 gas-lamps, the small representation of the old flat-flame order of lighting, and the largeness of the number of incandescent gas-burners, are pleasing features; and they show an enlightened appreciation of the best means of satisfying the requirements in the matter of public lighting of this largely populated quarter of London, and a desire on the part of the Council, while not ignoring the claims to patronage of their own electricity undertaking, to fulfil their obligations in respect of street lighting in an economical and yet efficient manner. But in connection with the incandescent gas-lamps, economy has not been carried to the same length as is found in some other districts of London—that is to say, to the reduction of the gas consumption to the lowest ebb to which it is possible to go, or to a point which is more consistent with interior than with exterior illumination. Of course, Hackney is only one of several districts in which the consumption has been kept, on the change to incandescent gas lighting, at an efficiency-producing point; but the recurrence of No. 2 burners in districts with which we have just been dealing makes irresistible this little comment. However, Hackney has not gone in for high-pressure or high-power incandescent gas lighting; the nearest approach being three lamps fitted with two burners consuming 3½ cubic feet each and the pilot, and three metered lamps, also fitted with two burners. The single burnered incandescent lamps consist of 2359 of 3½ cubic feet per hour, 12 of 3½ cubic feet per hour and pilot, 1 of 4¼ cubic feet per hour and pilot, 378 of 4¼ cubic feet per hour, and 3 metered lamps. In the series of flat-flame lamps is found a miscellaneous collection. The clusters of flat-flames comprise 14 of 10 cubic feet per hour, 1 of 12 cubic feet per hour, 2 of 20 cubic feet per hour, 1 of 24 cubic feet per hour, and 11 metered lamps; while in the single burner line, there are 17 lamps consuming 4½ cubic feet per hour, 454 5 cubic feet per hour, 1 6 cubic feet per hour, and 3 metered. Coming to costs, the amount paid per arc lamp is £18, which includes current, maintenance, and capital charges for columns, lamps, &c. The average duration of lighting is 2952 hours per lamp per annum. The cost of the Nernst lamps is £4 per annum, embracing the same charges as in the case of the arc lamps, but the hours of lighting number 3940 per annum. The cost of the incandescent gas-lamps per burner, including maintenance (taking gas at 2s. 5d. per 1000 cubic feet, and the lighting hours at 3940 a year) is £2 17s. 11d. for the 3½ cubic feet per hour burners, and £3 7s. 6d. for the 4¼ cubic feet per hour ones. Neither of these amounts (Mr. Scorgie informs us) includes the cost of initial installation of new and improved lantern, burner, cock, governor, frog, and ladder iron, &c. The cost under these heads totalled to £1 16s. and £1 17s. 6d. respectively per lamp, the payment of which is spread over a period of five years, in twenty quarterly instalments, without interest. The cost of the flat-flame burners (reckoned at 5 cubic feet per hour consumption) is £3 5s. 7d.

Hammersmith.

From Mr. H. Mair, M.Inst.C.E., the Borough Surveyor of Hammersmith, comes another highly interesting return. The Borough Council rule an important territory, comprising 2282 acres. Here, again, the Council provide the electric current required in the district; and consequently the public lighting is partly electric, but to a far larger extent incandescent gas-burners are found. Flat-flame gas-burners have been almost blotted out of existence here; but nine are still maintained, for what reason we cannot divine, unless it be a desire to preserve for the edification of the ratepayers a few specimens of what has been. Additional interest is lent to the figures by the fact that the gas-lamps are supplied by two Companies—the Gaslight and Coke and the Brentford; and Mr. Mair has separated the charges, instead of averaging them. Turning to the figures, it is seen that the electric arc lamps number 165; and the incandescent electric lamps (of the Loftus pattern) 74. The average cost of the arc lamps per year is £22 10s.; and the incandescent electric lamps are charged at £7 and £4, or an average of £5 10s. We may at once dispose of the nine flat-flame (5 cubic feet) gas-lamps, by saying that the charge of the Brentford Gas Company is £3 7s. 2d. per annum, and of the Gaslight and Coke Company £3 9s. 3d., including gas, lighting, cleaning, maintenance of burners, &c. There are no high-power or cluster incandescent gas-lights in the district; but the single incandescents number 1223, some of which are "C" burners consuming 3·5 cubic feet per hour, and the remainder No. 3 burners consuming 2·5 cubic feet. For the "C" burners, the Brentford Gas Company charge £3 7s. 4d. per annum; and for the No. 3 ones, £3 4s. 5d. The charges of the Gaslight and Coke Company are respectively £3 18s. 4d. and £3 6s. 5d. These figures also include gas, lighting, cleaning, the maintenance of burner, &c.

Hampstead.

Still another instance of a District Council with an electric lighting undertaking, and giving their patronage largely to incandescent gas lighting, is supplied by Hampstead. As the examination of the returns one after the other from districts north of the Thames proceeds, one is forcibly struck by the immense change that has come over the public lighting, through the incandescent gas system, during recent years. Here we have it from Mr. Oliver E. Winter, Assoc.M.Inst.C.E., the Borough Engineer and Surveyor of Hampstead, that, in the Council's area of 2265 acres, the number of electric arc lamps is 122, of incandescent electric lamps 41, of incandescent gas-lamps 2233, and of flat-flame lamps only 17. So that the conversion from the ancient to the modern is nearing completion. The arc lamps cost £28 each per annum, including repairs, cleaning, &c.; and the incandescent electric lamps, £6 12s. each. Of the incandescent gas-lamps, 2188 are single burners, consuming 4¼ cubic feet per hour, and costing £3 9s. each; 35 are doubles, consuming 8½ cubic feet per hour, and costing £6 2s. 11d. each; and 10 are triplets, consuming 12¾ cubic feet per hour, and costing £9 1s. each. The figures relating to the 17 flat-flame gas-lamps are: 8 lamps, burning 4 cubic feet an hour, cost £2 16s. 9d. each; 2, burning 5 cubic feet an hour, cost £3 6s. 3d. each; 2, burning 10 cubic feet an hour, cost £5 13s. 11d. each; and 5, burning 30 cubic feet an hour, cost £16 8s. 8d. each. Upon the figures referring to the gas lighting, Mr. Winter observes that "the gas and everything in connection with it, except the posts, are supplied by the Gaslight and Coke Company."

HOLBORN.

The intelligence sent by Mr. G. Wallace, the Borough Engineer, as to what is being done in Holborn is very agreeable and welcome. This is one of the districts which, though slow to move, has eventually gone plump for the light which naturally meets with our fullest approval. The Council exercise jurisdiction over 405 acres of a very busy section of Commercial London. In Mr. Wallace's own concise terms, what is being done may be told. He says: "This Council have not adopted the electric light in the borough, but are fitting *the whole of the lamps with the Welsbach incandescent burner*. The number fixed at present is 600." There are still 1283 lamps to come under treatment; so that ultimately Holborn will be lighted with at least 1883 incandescent gas-lamps. The average consumption of gas per incandescent burner is 4¼ cubic feet per hour, while each flat-flame burner consumes ¾ cubic feet more. The average cost of the incandescent gas-lamps per burner (including maintenance) is £3 11s. 10d., compared with £3 9s. 1d. for the flat-flame burners. Therefore, when the whole of the lamps are converted, the annual increased charge for lighting over the whole district will, on the foregoing figures, only amount to about £260. Compare this with the improvement in the lighting, and with what the increase in cost would have been if electric lighting had obtained the preference!

ISLINGTON.

Although not by any means the largest area in London, Islington boasts the largest population of any of the municipal districts—there being within the 3092 acres constituting the Council's area a population of 339,137, or thereabouts. Mr. J. Patten Barber, the Borough Engineer, and Mr. Albert Gay, the Electrical Engineer to the Council, combined to furnish us with complete statistics as to the public lighting. This is another of those boroughs already met with in which, while there is a fair amount of street electric lighting, there has been an extensive improvement in the general lighting by the almost complete conversion to the incandescent gas system of the lamps in the streets not electrically illuminated. There are 483 electric arc lamps and 16 incandescent electric lamps, against which we are able to set 4165 incandescent gas-lamps and 143 flat-flame lamps. It is to be hoped, if only for the sake of the saving to be effected of 7s. 1d. per lamp, that the last-named will soon exist only as a memory. Of the incandescent gas-burners, 4109 are singles, and 56 lamps are fitted with clusters. The average consumption of gas per burner is 4 cubic feet per hour; while that of the flat-flame lamps is 6 cubic feet. As to the average cost per lamp, the electric arcs work out to £28, the electric incandescents to £5, the incandescent gas-burners to £3 7s. 1d., and the flat-flames to £3 14s. 2d.

KENSINGTON.

The Lighting Engineer of the Royal Borough of Kensington is Mr. Philip Monson, M.Inst.E.E.; and it is to him that we are indebted for an exceedingly gratifying set of figures. The borough extends to 2292 acres, and has within its bounds 92 miles of streets. Even Kensington has not thought fit to go in for a larger installation than 112 electric arc lamps; but they have seen the wisdom of applying incandescent gas-burners to all other parts of the borough, and discarding entirely the flat-flame burner. Altogether, there are 4379 incandescent gas-lamps in the district, of which 4322 are singles, 46 clusters, and 11 high-power ones. The average consumption per burner is 4¼ cubic feet. Concerning costs, the average per arc lamp per annum is £23; and the average of the incandescent gas-lamps per burner, including maintenance, is £3. It is mentioned by Mr. Monson that "gas is supplied by the average meter system; and the Council do all the work of lighting, extinguishing, cleaning, and repairs without the intervention of a contractor."

LAMBETH.

The return relating to this district has not been received from Mr. H. C. J. Edwards, the Borough Surveyor; but he has kindly intimated that he is tabulating the information. Meanwhile we are in a position to publish the figures referring to the area supplied by the South Metropolitan Gas Company; and if there are additions to be made, they can be given when (we hope it will be in a few days) Mr. Edwards's statistics arrive. The Borough Council have jurisdiction over a district measuring something like 4080 acres, of which 3600 acres are in the area of the South Metropolitan Company. The figures available show that within this populous district, the public ways are lighted by 3646 incandescent gas-lamps, of which 30 are clusters and 3616 singles. These are fitted with Nos. 2, 3, and 4 burners, consuming, per annum, according to estimate, 10,500, 14,700, and 18,900 cubic feet respectively. The charge is: For No. 2 lamps, £2 10s.; for No. 3, £2 18s.; and for No. 4, £3 6s. Search would reveal the presence of only half-a-dozen flat-flame burners in the district, four of which consume 5 cubic feet an hour, and two 10 cubic feet; the annual charge for these being at the rate of £3 3s. 9d. per 5 cubic feet burner.

LEWISHAM.

In magnitude of area, the district of the Lewisham Borough Council ranks third among the Metropolitan Boroughs; being exceeded only by Wandsworth and Woolwich. Its size is 7011 acres. In his return, Mr. Ernest van Putten, the Borough Surveyor, dismisses the inquiries as to electric lighting with the remark "there are no electric lamps in the public highways." He might have added "and no flat-flame gas-lamps," seeing that the public ways are lighted entirely by 2915 incandescent gas-lamps. In considering this number in conjunction with the area, it must be remembered that this is what might be termed an outlying district, largely residential, and with not inconsiderable areas still to be developed by the builder. Incandescent gas-lamps to the total of 2797 are fitted with No. 2 Kern burners, 2 with No. 3 burners, 48 with No. 4 burners, and 68 with clusters. Formerly the district was lighted by 5 cubic feet flat-flame burners; the consumption of the 2797 No. 2 incandescent burners is placed at exactly *half* of that 5 cubic feet. The average cost of the No. 2 burners, including maintenance, is £2 10s. each, of the No. 3 burners £2 18s., and of the No. 4 burners £3 6s. The old flat-flame burners cost £3 3s. 9d. each; so that a considerable saving has been effected over the whole. Even if No. 3 instead of No. 2 incandescent burners had been adopted throughout, there would have been a saving of 5s. 9d. per lamp; while if No. 4 burners had been used, the extra price would have been only 2s. 3d. per lamp.

PADDINGTON.

Incandescent gas lighting has found great favour in the eyes of the Borough Council of Paddington, who control a district having an extent of some 1354 acres. The Borough Surveyor is Mr. E. B. B. Newton, Assoc.M.Inst.C.E.; and to all the questions put to him respecting electric lighting, he appends for reply the useful contraction "*nil*." Up to the present, 2365 incandescent gas-lamps have been established, of which 2307 are singles, and 58 clusters, composed of three No. 4 Kern burners. Relics of past street lighting are seen in 191 flat-flame lamps; but these are doomed, and an important extension of improvement by large additions to the newer system of lighting is imminent. "I expect," writes Mr. Newton, "some 1500 new incandescent lamps will be added during next year to the 2307 above mentioned." We congratulate the Borough of Paddington. But to return to present figures. The average consumption of gas per hour by the cluster incandescent lamps is entered at 12·6 cubic feet and pilot, and of the singles at 4·2 cubic feet. The flat-flame burners consume 4·6 cubic feet per hour. This is low; and consequently there has not been much room for a saving to be effected in gas consumption—that is to say, by adopting the excellent sized incandescent burner that has been preferred in this case. However, the improvement in the street lighting compensates again and again for the increased cost of 2s. 6d. per lamp per annum. With a charge for gas of 2s. 3d. per 1000 cubic feet, the average cost of the incandescent gas-burners (with maintenance) is £3 2s. 6d., and of the flat-flame burners £3.

POPLAR.

The public lighting of this borough is entrusted to the Council's Electricity Department, and the Engineer (Mr. D. Macfarlane Macleod) has courteously placed all the information required at our disposal. The area of the borough is 4 square miles; and in it electric lighting has a very valuable share. There are in all 320 arc lamps, of which 75 are 10-ampere Brockie-Pell lamps, 115 7½-ampere ditto, and 130 7-ampere Bremer flare-arc lamps. There are also a large number of incandescent electric lamps—viz., 482 24-candle power posts and 20 64-candle power. The 10-ampere arcs cost £29 3s. 8d. each per annum, the 7½-ampere arcs £19 16s., and the 7-ampere Bremer arcs the same. As to the electric incandescents, the average cost of the 24-candle power posts is £5 6s. 9d., and of the 64-candle power ones £14 4s. 8d. The incandescent gas-burners number 865, but included in this are, we believe, some 200 flat-flame burners which are now being displaced by the incandescents. Respecting the average cost per incandescent gas-burner, the Council pay the Gas Company a rental of £3 9s. each, which includes maintenance and painting.

(*To be continued.*)

THE TRANSMISSION OF ENERGY BY GAS-PIPES, CABLES, AND COAL-TRUCKS.

IN view of the various pending projects for transmitting power and heat to a distance, some calculations of Mr. C. A. Smith, published in the "Electrical Review," on the relative efficiencies of such transmission by copper wire, gas-pipe, and coal-truck, are interesting if not conclusive. A short time ago, Mr. Smith discussed the subject in the same periodical, on the basis of a transmission of 6000 brake horse power to a distance of five miles. Neglecting leakage and line-losses, he found that the line-costs worked out to 0·126d. per unit for electricity, as compared with 0·05d. per unit for gas. The author has now proceeded to deal in the same way with a transmission of 25 miles, in order to compass all the likely cases proposed for the United Kingdom. To complete the statement, the possible economy of carrying the coal over the distance, instead of either the electricity or the gas produced from it, has been also considered. For the purpose of comparison with other figures which have been recently published the amount of energy dealt with is 1000 kilowatts. There is actual information available in regard to the cost of an electric

underground cable for conveying 1000 kilowatts; such a main at Manchester having cost, according to Mr. Wordingham, £1800 per mile. The cost of 25 miles of a main of this kind would consequently be £45,000. Taking 10 per cent. as the charge for capital and depreciation of the main, the annual cost comes to £4500. Assuming a 25 per cent. load-factor, the number of units transmitted would be 2,190,000 per annum, neglecting losses. This, of course, on a delivery of 1000 kilowatts at the inlet of the sub-station supplied. Allowing 80 per cent. efficiency for the transformers, the actual delivery of energy on the consumption side of the sub-station would be 1,752,000 per annum, which shows a line-cost of 0·61d. per unit. This agrees fairly with Mr. Wordingham's figure. Roughly speaking, therefore, it is impossible to transmit 1000 kilowatts of electrical energy to a distance of 25 miles at a less cost than something between ½d. and ¾d. per unit, with a very moderate amount of leakage or waste, for line-costs alone. This looks like a direct rate of increase, with the distance, of about 0·13d. per unit for every five miles. So far, therefore, Mr. Smith's calculations hang together.

We will now take the gas transmission—producer gas being understood. Energy of the amount of 1000 kilowatts on the inlet of the receiving station is equal to a development of 1340 brake horse power by gas-engines on the spot. Assuming the power to be converted into direct-current electricity as before, the output would still be 1,752,000 units per annum. Mr. Smith next proceeds to assume a gas consumption by the engines at the rate of 70 cubic feet per brake horse power per hour, which would make the total hourly consumption 93,800 cubic feet. He takes the weight of 70 cubic feet of the gas at atmospheric pressure to be 4·179 lbs., and therefore 0·001161 lb. of gas per second is required (according to him) per brake horse power. After working out several cases, the author believes that the most economical initial pressure for a gas transmission of 25 miles (the final pressure to be atmospheric) is 5 atmospheres.* In such a case, the indicated horse power for the compression of the supply for 1340 brake horse power at the gas-engine sub-station is 218, which at £7 10s. per indicated horse power makes the cost of the compressor £1635. The diameter of the gas-main required to carry this 93,800 cubic feet of gas per hour is worked out at "½ foot," as Mr. Smith puts it. The cost of the main, at the price of £10 per ton, is £0·20 d per foot run, where d is the diameter in feet. This gives, for a main ½ foot diameter, and 25 miles long, £13,200 as the actual cost of the pipe. Taking 2 feet clearance all round, and the cost of excavation, laying, and filling in at 2s. 9d. per yard cube, the cost of the main laying amounts to £4100 for the 25 miles run. The total cost of the compressor, main, and laying therefore amounts roughly to £19,000, compared with £45,000 for an electric cable. The capital charges on these sums are, at 10 per cent. as before, respectively £1900 and £4500 to do the same work; or, at 25 per cent. load-factor, say ¼d. per unit for gas, as compared with double or treble the figure for electricity.

The foregoing result, however, is highly theoretical, and savours very much of the drawing office. It is open to many criticisms which gas engineers are as well able as electricians to offer. Not one of Mr. Smith's principal data can be referred to ascertained fact, like Mr. Wordingham's cable. The true comparison should be with the delivery of energy from the sub-station, assuming the means of transmission to be indifferent. Then we should have to take many things into the comparison besides those regarded by Mr. Smith. Gas-engines, to begin with, cost more than transformers; and whatever the difference in cost of these or their housing, should be placed against the system. Also the working expenses, and the stand-bys. Next, what is the warranty that 1340 brake horse power would be continuously generated out of producer gas consumed at the rate of 70 cubic feet per B.H.P.? We should take it at 100 cubic feet instead, at the very lowest, allowing for the engines not being fully loaded. This at once increases by one-third Mr. Smith's estimate of the weight of gas to be transmitted. And where is any gas compressed into mains under a pressure of five atmospheres, or 73 lbs. per square inch? Moreover, Mr. Smith forgets the working expenses of his compressors. There are no available data to go upon; but it is not too much to say that his estimate of ¼d. per unit as the line-cost of transmitting gas under these conditions is absolutely worthless. An electrician might say, with much force, that Mr. Smith has quite failed to prove that producer gas transmission to a distance of 25 miles is even as cheap as electricity. If it is taken at that, both are hopelessly beaten by the railway carriage of the equivalent coal.

Railway rates for coal vary; but they are not far from 1d. per ton per mile for the distance in question, with 6d. per ton for the trucks, and 6d. for terminal charges—say, 3s. per ton inclusive. Mr. Smith expects that, with a 25 per cent. load-factor, the coal consumption of his station would be 1600 tons per annum, the carriage of which would cost no more than £224. This is a serious conclusion, which at first sight, as he confesses, appears to knock the "line transmission" of gas or electricity out of the question altogether. Nor does a more careful inspection mend the matter. Mr. Smith appreciates the width of the margin it is necessary to cover, in order to justify centralized power-gas production; and all he can suggest is that the difference "would surely be exceeded by the extra cost due to generating Mond gas in sporadic quantities, rather than in one concentrated station where ammonia recovery would be possible." Also, "probably the difference in the rates and taxes on the Mond gas plant situated 25 miles away and that of a plant situated in the centre of the city—obliterating for the moment such social considerations as the advantages of manufacturing the gas away from the city—would more than compensate for this difference." The hope is somewhat tenuous. The latter consideration in particular is difficult to evaluate in coin of the realm. Mr. Smith perceives that centralization for electricity generation is doubtful economy beyond a certain economical maximum of (say) 50,000 horse-power; but he asserts that the same is not true of Mond gas, as to which "there is every reason to believe that the larger the size of the station the more marked the reduction in the working expenses for producing 1000 cubic feet of gas."

In such a problem, the question of heating should most certainly also be considered, Mr. Smith thinks; "for it is in this respect that power-gas will play such a prominent and humanizing part in years to come." This author evidently wonders why it has not already done so. It is, he remarks, 22 years ago since Sir Oliver Lodge spoke of a triple revolution which he thought would at that time immediately take place. "He spoke of a revolution in methods of lighting, in heating, and in power production, and he hailed the introduction into our daily life of these processes and devices for smokeless combustion, with the greatest hope and enthusiasm, as a means of indefinitely benefiting the human race." The event has turned out differently; and writers like Mr. Smith should investigate the reason why. It is as true to-day as it was 22 years ago, that the general application of gas power for doing the world's work would possess some advantages. Yet it is not to be lightly assumed that all commercial enterprises of the kind are likely to prove gold mines. Moreover, there is gas and gas; and it is by no means clear that promiscuous distribution and burning in populous places of any known variety of producer gas would effect a material improvement in the every-day conditions of living. Indeed, there are those who hold that gas-producers in working are usually unmitigated nuisances, and that the burning of their gaseous products in populous places is no better. As the French say, these critics "have reason," and are not to be lightly dismissed as prejudiced persons.

* See also "JOURNAL," Vol. LXXXIV., p. 202.

ELECTRIC LIGHTING MEMORANDA.

The Sale of Electricity by Local Authorities—A Question of Price—The London County Council on Depreciation—Losses Surcharged at Barking—Result of the Marylebone Poll.

THE question of the price at which local authorities can afford to sell electricity for lighting and miscellaneous power purposes is discussed once more by the electrical expert of the "Municipal Journal," with special reference to three Lancashire instances—Oldham, Lancaster, and Nelson. It will be instructive to follow the criticism of these undertakings; for, of all places, the region in question may surely be regarded as favourably situated for the cheap supply of steam fuel. These undertakings are of different magnitudes—Oldham being by far the largest. It represents a capital commitment of close upon a quarter of a million sterling, on which the gross revenue comes out at rather more than 10 per cent. This being the case, and the working expenses amounting as usual to about 50 per cent. of the income, it follows that there is a gross profit balance of between 5 and 6 per cent. on the capital. Out of this, about one-half has to go for interest and sinking fund; which is as much as to say that Oldham obtained its electric lighting capital some time ago, when loans were granted for this purpose for long periods. The result is to show a net profit on the year's working of £4671, every penny of which would otherwise have been needed for the sinking fund. As it is, the Oldham Corporation allow themselves the luxury of transferring £134 to the only equivalent for a depreciation fund which appertains to the undertaking. It scarcely sounds convincing; and if the gross profit on the Oldham undertaking after ten years does not amount to more than between 5 and 6 per cent. on the borrowed capital, the right of the concern to be classified as remunerative may well be questioned. And this result has only been attained after the advent of a traction load which trebled the output. Lancaster has made a gross profit of £3117 on a total capital outlay of £55,000. It is not much. Here, again, the loan having been taken up ten years ago, the charges for repayment are comparatively light; so that the Corporation can flatter themselves upon a nominal net profit balance of £1363. Again, no depreciation. Nelson frankly confesses a deficiency of £516 on the working of the year, which, after eleven years, is rather disappointing. The case looks even worse, seeing that for some years past Nelson has claimed to have made a net profit. The suggestion here is that the selling price is not high enough.

The question put by our contemporary on the data supplied by these three Lancashire undertakings is "whether local authorities having an output well under half-a-million units, can afford to sell at an average price of less than 3½d. per unit;" and the answer given is in the negative. Street lighting and traction sales do not enter into this inquiry at all, seeing that they are everywhere done at about the same figure of 2d. per unit. This is barely getting the change for a sovereign, if so much. There is no sense whatever in undertaking a large traction business

unless money is to be made out of it, which does not appear to be generally the case. At Nelson, especially, there is a traction supply greater in amount than the public and private lighting put together; and the net result is a positive and apparently increasing loss. The natural inference from this state of affairs would be that Nelson does not want electricity supply, and that there is consequently an insufficient sale for the production, though the prices have been reduced to an unremunerative level. It is significant that our contemporary, notwithstanding its prejudice in favour of municipal trading, can find nothing comforting to say to the Nelson people. It is another remarkable characteristic of electricity supply charges, that they do not resemble gas in being usually dearer in small places than in large towns. Thus, a comparatively little place like Nelson endeavours to do business at the Oldham prices, which is absurd, from the purely commercial point of view. It is another illustration, however, of the truth that ordinary commercial considerations do not prevail with trading municipalities, which are rather accustomed to get such prices as they can for their services, when they cannot obtain such prices as they would like. The difference comes upon the rates.

The subject of depreciation allowances in respect to municipal electricity supply works has again been raised by the London County Council with relation to the borrowings of Metropolitan Local Authorities. The County Council have been circularizing the London Municipal Boroughs as to the conditions upon which they are prepared to sanction loans for electric lighting, and intimating that the creation of renewal funds in such cases is desirable in the interest of prudent finance. It is astonishing how virtuous the London County Council can be for other bodies. Not one of the London Local Authorities who have electric lighting undertakings has yet made any provision of this nature; and one of them—the Islington Borough Council—has represented to the County Council its desire to postpone the formation of such a fund till the end of the current financial year, "when it is hoped the finances of the electricity undertaking will be in a better position." Meanwhile, Islington wishes to incite the London County Council to introduce legislation to enable the Borough Councils to purchase electric motors for letting on hire, to wire consumers' premises, and so forth. This is a curious way to promote economy, and to safeguard money borrowed on the security of the rates.

A very curious and remarkable state of affairs has arisen in connection with the electric lighting undertaking of the Barking Urban District Council. This venture was strongly opposed when the Council had it in contemplation—several of the largest ratepayers in the district being firmly persuaded that it could not pay and was not wanted. As usual, their prudent counsels were overruled, and municipal "enterprise" was given its head. The result has not long been left in doubt. The electric light undertaking has proved a heavy loss, which the Council tried to mask by carrying the deficits to a suspense account. This expedient was discovered and disallowed on audit; and the members of the Council responsible for it have been surcharged. An appeal from the action of the Auditor to the Local Government Board has been unsuccessful. A similar condition prevails in respect to the light railway undertaking of the Council, on which halfpenny fares have been introduced with disastrous effects upon the revenue. So serious do these matters appear to the Council, that it is in contemplation to dispose of both undertakings to the highest bidder, so as to relieve the members from any further responsibility for a condition of affairs which should never have been permitted to arise. This is a bitter satire upon the idea of municipal trading, as a so-called "principle;" but it only goes to show that local authorities are as powerless as anybody else to make business pay where there is not enough of it.

The poll of the ratepayers of Marylebone on the question of the promotion of the Bill of the Borough Council for the carrying out of the electricity supply purchase, has resulted favourably to the measure. This result will strengthen the hands of the Council in face of the situation, and help them to find a way out of the deadlock. As reported in last week's "JOURNAL," the idea of leasing the undertaking when it is acquired appears to be gaining ground with the Council; and if the Bill passes, this expedient will probably be adopted. It will certainly have the effect of disarming those opponents of the past action of the Council in the matter who do not so much dispute the award, as disbelieve in the competency of the Council to carry on so enormous an undertaking. It remains to be seen what tenders for the lease can be obtained; and there is no reason why the competition should not be an open one. A clause to make provision for leasing the undertaking will have to be inserted in the Bill; and it will be an unusual provision. Still, in the circumstances, the Board of Trade will be solicitous solely for the protection of the parties from injuring one another; so that an exceptional Act of Parliament may be the outcome of as difficult a situation as the Department has ever had to deal with in the whole course of its existence.

The Yorkshire Junior Gas Association have arranged a meeting for next Saturday, when a visit will be made to the tar-works of the Halifax Corporation. After the inspection, the members will have tea together, and then the postponed discussion will be taken on Mr. J. F. Smith's paper on "Gaseous Firing."

THE LATE MR. OVINGTON.

IN the "JOURNAL" for the 26th ult., was briefly recorded the death of Mr. John Ohren Ovington, which took place on Jan. 20 at his residence at Upper Norwood. Some further particulars are now to hand regarding Mr. Ovington's long connection with the Rio de Janeiro Gas Company. From these, we learn that during the time he held the position of Engineer-in-Chief of the works, he had various difficulties to contend with. Two emergencies in particular may be mentioned. On one occasion, a gasholder burst in the midst of a gale; and another time, during a riot in the city, the mob made an attack on the gas-works, as being owned by a foreign Company. The Directors showed their special appreciation of such services by presenting Mr. Ovington with a silver claret-jug and goblets. During his administration at Rio, the gas-works were enlarged to double their original capacity. In 1886, he left, on the English Company being succeeded by a Belgian Company, who offered a lower tender for the lighting. Referring to his departure, the "Rio News" contained the following remarks: "His zeal and judgment in carrying out with unfailing regularity the engineering work for the lighting of this extensive city and suburbs for so many years has, we feel sure, earned him the genuine respect of this community, and he will carry away with him the regrets of all for his departure and their best wishes for his prosperity elsewhere." In 1887, after but a short period of leisure, Mr. Ovington was appointed Manager and Engineer-in-Chief of the Monte Video Gas Company, from which post he returned home in 1890 to live in restful retirement. Among Mr. Ovington's writings, we find a report, published in 1867, on "Tar as Liquid Fuel for Retorts;" and in 1883 a contribution to the "JOURNAL" on "Gas Purification, and the Proper Proportion for an Oxide Vessel."

THE GAS AND WATER STOCK MARKET.

(For Stock and Share List, see p. 422.)

THE Stock Exchange has had an interesting and instructive week. It opened very gloomy at the aspect of war; and by midday on Tuesday the horizon was very black—fears of a squeeze for money helping to make the general outlook darker. Consols were marked down to 86. Then things began to brighten a little, and, after some hesitation, quite a cheerful feeling prevailed at the close; and the last mark in Consols was 87⅛. The fortnightly settlement caused some anxiety; and at least one operator was caught in difficulties. In the Money Market, there was a good demand for Stock Exchange and other requirements; and terms stiffened. Discount rates hardened materially; but the tension eased off before the finish. In the Gas Market, the volume of business showed a falling off from the previous week's record, mainly through reduced operations in the biggest issue; but a few other issues did their best to restore the average by considerably accelerated activity. A general absence of buyers had a crushing effect wherever stocks had to be pressed for sale, and poor prices had to be accepted. This enforced depression ought to prepare a nice position for a rise when public confidence begins to revive. In Gaslight and Coke issues, there were moderate dealings daily in the ordinary. The price shrank at first, and by midweek was down to 88½. But from this point it began to recover; and on Saturday it was done at 87½ *ex div.*, which is better than 89½ *cum div.* The secured issues were quiet; the maximum being strong and effecting an advance. South Metropolitan was very active and inclined to advance. The best price was 118 *ex div.*, which is better than 120½ *cum div.* Commercials were more active than of late; but prices did not advance. The issue of the Company's accounts completes the Metropolitan record for 1903; and they show that the undertaking has had a very good half year. In the Suburban and Provincial group there was very little doing. A parcel of British and another of Lea Bridge were let go at a sacrifice; and down went the quotations. But Alliance had a rise. Locally, Newcastle had a nice advance in view of the accounts issued. In the Continental Companies, Imperial was freely offered; and the price shrank accordingly. The remoter undertakings were not conspicuous. In Water, attention was almost concentrated upon Southwark, which was far more active than all the other Companies put together. The quotation was put up 15 points; but 5 were knocked off before the close.

The daily movements were: Monday was steady and unchanged. On Tuesday, Gaslight ordinary, British, and Imperial fell 1 each. Southwark Water rose 5. On Wednesday, Gaslight maximum rose 1, and Alliance old ½; but Imperial fell 1. Southwark Water rose 10. On Thursday, Lea Bridge fell 8, and Imperial 1½. On Friday, Imperial fell 1 more. In Water, Lambeth and Southwark fell 5. On Saturday, Imperial recovered ½. In Water, Lambeth was put up 5.

The death took place on Friday of Mr. W. Griffith, the Chairman of the Holyhead Water Company. He was one of the best known men in Anglesey, and held positions on the County Council, the Urban District Council, the School Board, and several other local institutions.

COMPLETION OF THE RECONSTRUCTION OF THE CHESTERFIELD GAS-WORKS.

THE Chesterfield Gas and Water Board have been putting their house in order; and, so far as the gas portion is concerned, for a time at least, they have come to the end of the work set before them. By all accounts, the process of bringing about order has not been a simple one. The constituent parts of the manufacturing plant which the old Company left behind them in March, 1896, when the works were transferred, it is said, were not desirable from several points of view; but, as they have been completely effaced, their deficiencies need not now be recounted. The Board who control the undertaking in conjunction with the water supply is composed of twelve members—eight being drawn from the Chesterfield Corporation, and two each from the District Councils of Newbold and Whittington; and these gentlemen—though they entered upon the management of the gas-works without any other qualification than those of business capacity and commonsense and a strong reliance on their Engineer and Manager during the past seven years (Mr. W. T. Buckland)—have achieved a distinguished success. Their works to-day are thoroughly up to date; and the gas business has, during the period of their direction, developed by about 78 million cubic feet—that is to say, in 1895, the old Company sent out 59,314,000 cubic feet of gas; and March this year will have seen over the twelve months a consumption of at least 137,300,000 cubic feet. But what is very remarkable about this is that the Corporation own the electric light undertaking, and this branch of municipal venture, like the gas concern, has been making notable strides—in fact, right away from the first year, after meeting principal and interest, there has been a profit. This profit is a matter into which we have no occasion in this article to make close inquiry. However, there is one thing about the transaction which put the gas-works into their possession over which the members of the Board are still somewhat sore; and the completion of the new works' scheme rather poignantly irritates the memory. It is the price they were called upon to pay for the concern. For the gas portion alone, they had to pay £106,500, besides taking over a mortgage of £15,500. Then almost immediately after they entered into occupation, the question of constructing new works had to be taken—it could not be avoided—into consideration; and from first to last the works as they stand to-day have cost them, in round figures, £50,000, without reckoning what has been expended out of revenue. This, on top of the sums previously mentioned, makes a heavy figure; and by the time principal and interest has been paid, there is not much left for that dearly-loved purpose described in municipal language as "the relief of the rates." This being so, if there had not been the large increment of business that has been shown to have occurred since 1896, what would have been the financial results of the purchase to-day? The bare thought is enough to make the members of the Board shudder even in the midst of their confessedly heavily shackled prosperity of the present. However, that the Board are now in a state of comparative comfort in view of their great progress in consumption is a matter upon which they may be most heartily congratulated. The consumers, too, are not without cause for jubilation. The price of gas has been reduced since the old Company's days from 4s. per 1000 cubic feet to 3s. 4d. for lighting purposes, and (supplied through a separate meter) to 2s. 6d. for cooking, heating, and motive power. From the charge of 3s. 4d., a discount of 5 per cent. is allowed on consumptions of from 200,000 to 300,000 cubic feet and 7½ per cent. on 300,000 cubic feet and upwards.

Now all this marvellous increase in business could not be met without considerable additions to works; and, rather than patch, it was determined early in the days of the Board's existence to take the "bull by the horns," and practically re-construct the works, and adopt approved methods of latter-day practice. The justification for this will be seen at once, when it is mentioned that, in the year preceding the taking over of the works in March, 1896, the total quantity of gas sent out was (as previously mentioned) only 59,314,700 cubic feet. At that time, there were fourteen beds of five ⏍ retorts, 9 ft. by 21 in. by 15 in., direct fired; and of this number twelve beds were at work during December, 1895—the average make then being about 290,000 cubic feet per day. Two years later, the seventy retorts were working to their full capacity, and were making 345,000 cubic feet of gas per twenty-four hours; while the maximum day's output reached 444,000 cubic feet. As the historical sketch of the reconstruction scheme which will be made presently will clearly show, it was only partly carried out at the beginning; but the need of its ultimate completion can conveniently be emphasized here by giving some few additional figures. The first is the output for the current year already quoted—viz., 137,300,000 cubic feet; and Mr. Buckland gives the information that last Christmas Eve there was registered the record day's output of 822,000 cubic feet. The increase this year has been, in round numbers, 12 millions. At the date of the transfer, there were 1248 consumers. To that figure have been added about 1200 ordinary consumers, and something like 5000 prepayment consumers. Further words would be superfluous to prove the prudence of the Board in placing the works well ahead of requirements, as they have done by their last additions.

However, from the foregoing, it will be seen that the carrying out of the full scheme has been spread over the past six years or so; and therefore the account of it must—linked as the various sections are together—of necessity be of a somewhat historical nature. The old works which came into the hands of the Board were grouped near the present entrance to the works; they have now disappeared as completely as though they never had any existence. But the foundation of the present scheme had its birth in a project that was conceived and partly executed in 1877. During the parliamentary proceedings which eventuated in the transfer of the undertaking, a great deal was heard about a large retort-house, which was regarded as a good asset, but which had been a veritable white elephant to the old Company for the best part of twenty years. In fact, after it was built, it was never during the time of the Company brought into use—at all events, for the purpose originally intended. It was built under the advice of Messrs. T. & C. Hawksley; and in this strong, thick, time-defying structure, the hand of Thomas Hawksley is unmistakeably seen. The house, as originally built, was 167 ft. long, 52 ft. wide inside, and 27 ft. high to the eaves, with an octagonal chimney in the centre, and a coal-store each side 159 ft. long by 34 ft. wide inside. At the same time, a system of rails and crossings were laid (as shown in the plan) for facilitating the bringing in of the coal, lime, &c., and the removal of the coke and other material. But beyond this all that was done in the retort-house was to put in the foundations for the benches, to purchase the retort mountings for direct-fired settings, and to fix a cast-iron hydraulic main along each side of the house. The expenditure on this large and then useless work remained idle and unproductive for very nearly twenty years. Mr. Thomas Hawksley was a little too previous. His vision as to early requirements did not by a long way coincide with events. Twenty years later there would have been more reason in what he then advised. But while this work was not then carried further, progress was made with the installation of other new plant. A new purifier-house, with an underground tar and liquor tank, and meter governor and exhauster houses were built, and boilers were fixed. In the positions depicted on the plan, scrubbers and condensers were also erected; and for some years this plant, together with the then existing direct-fired retorts, satisfied the demands for gas.

Passing over a few years, and all that happened in connection with the purchase of the gas undertaking, and its commitment to the Board, we find the present Engineer and Manager, Mr. W. T. Buckland, taking charge of the works on Jan. 1, 1897; and the plant was all then in the position described. Counsel was taken with (the late) Mr. W. R. Chester as to the condition of the works, more especially in view of the rapid advance of the consumption. His advice was to abandon the then method of carbonizing, and substitute an up-to-date installation of inclined retorts, utilizing, as far as possible, the substantial retort-house which had been so long lying idle, also to in the near future extend the condensing, scrubbing, and exhausting plant and introduce a washer. It was found that the space between the chimney already built and the gable wall of the retort-house was such that six beds of seven inclined retorts could be erected; and designs and specifications were made by the Engineer for this extension. Early in the year 1898 contracts were entered into with Messrs. Robert Dempster and Sons, Limited, of Elland (who, in fact, have carried out the whole work from then to now) for the structural alterations to the house, inclined retort-bench, and coal-handling plant. It was necessary to strip the roof of the house and take it down, thoroughly overhaul, scrape, and paint it, and raise the walls to the required height—some 48 feet to the eaves. For a time, only one-half of the roof and building were raised; and the space between the raised roof and the lower roof was filled in by a temporary framework of steel joists and corrugated sheeting. The settings were built to the Engineers' design; and testimony as to their stability is found in Mr. Buckland's statement that three of the beds were only renewed last year (after four years' working) and the remaining three after five years' use. While in part this protracted length of hard working life must be ascribed to the design, some amount of credit must also be allotted to the Contractors. The capacity of this bench is equal to 600,000 cubic feet.

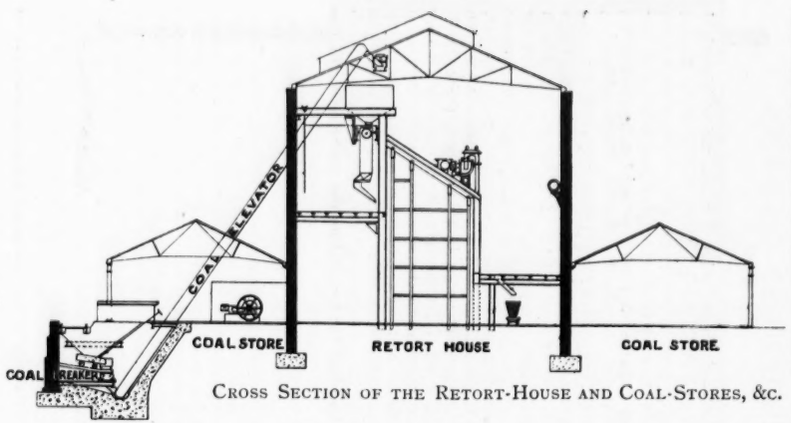
The work of converting the house and installing the carbonizing plant was really a fairly straightforward matter; but there is one difficulty which may be noted. That was in the construction of the breaker-pit. This is wholly underground; and excavations had to be made to a depth of 22 feet. The whole of the ground was saturated with water; and great care and skill were necessary to get the pit thoroughly tight. Success was attained by filling a cavity left in the walls with a mixture of pitch, oil, oxide, and sand, as prescribed by Mr. Chester. When the inclined retort-bench was well started, all the old retort-bench was cleared away.

The completion of this work left the Engineer free to carry out the extensions to the scrubbing and washing plant and to duplicate the exhausting plant. The two scrubbers were overhauled and doubled in height, fitted with new wood boards (they previously were only fitted each with three wood grids about 2 inches thick); and, together with the condensers, the bye-passes were all increased to 18 inches bore. A central ladder was fixed opposite the condensers, and a landing provided over the top chequered steel plate, from which ladders were arranged on either side leading to the top of the scrubbers. Each of these had

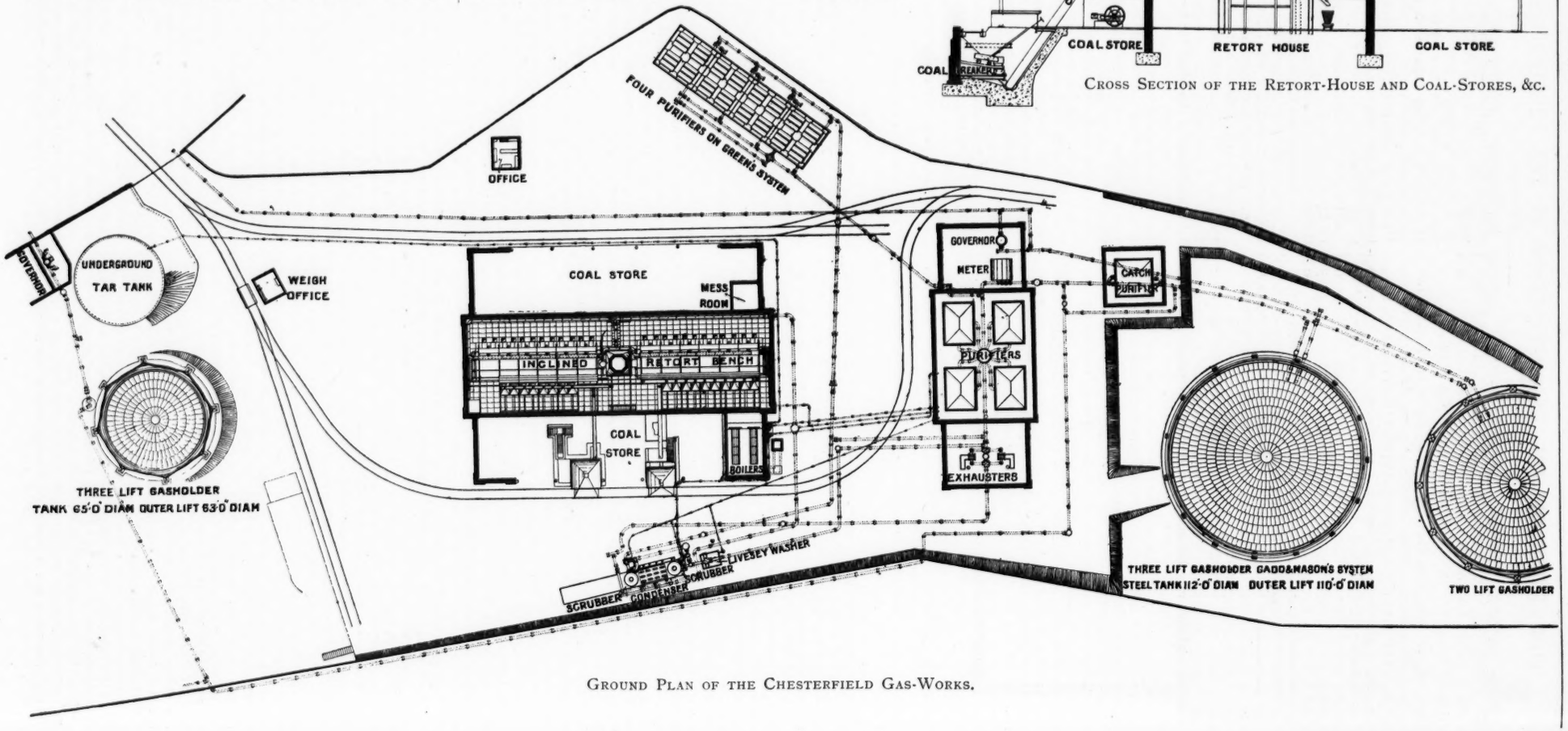
a balcony of chequered steel plates arranged around the outside, supported by cast-iron brackets; and a platform connected the two scrubber balconies together. A new Livesey washer (capable of dealing with 2 million cubic feet per twenty-four hours) was put in to work immediately in front of the two tower scrubbers. A new rotary exhauster, with steam-engine combined, with a capacity of 50,000 cubic feet per hour, was also fixed in the existing exhauster-house, alongside the old exhauster, which has a capacity of about 25,000 cubic feet per hour. The new exhauster is capable, if necessary, of passing up to 80,000 cubic feet of gas per hour.

Originally, the main flue from the boilers (which are erected in the coal-store) was connected up to the large chimney in the retort-house. But while the alterations were being effected, it was considered advisable to build an independent chimney for the boilers outside the gable end of the coal-store; and this was accordingly done—the new chimney being octagonal in shape, and sufficient for the needs of the two boilers. While this work was proceeding, advantage was taken of the opportunity to increase to 18 inches diameter all the gas-mains coupling the apparatus together, and to deepen the syphons. New tar and liquor pumps, with the connecting-pipes throughout, were also provided, and fixed alongside the boiler-house.

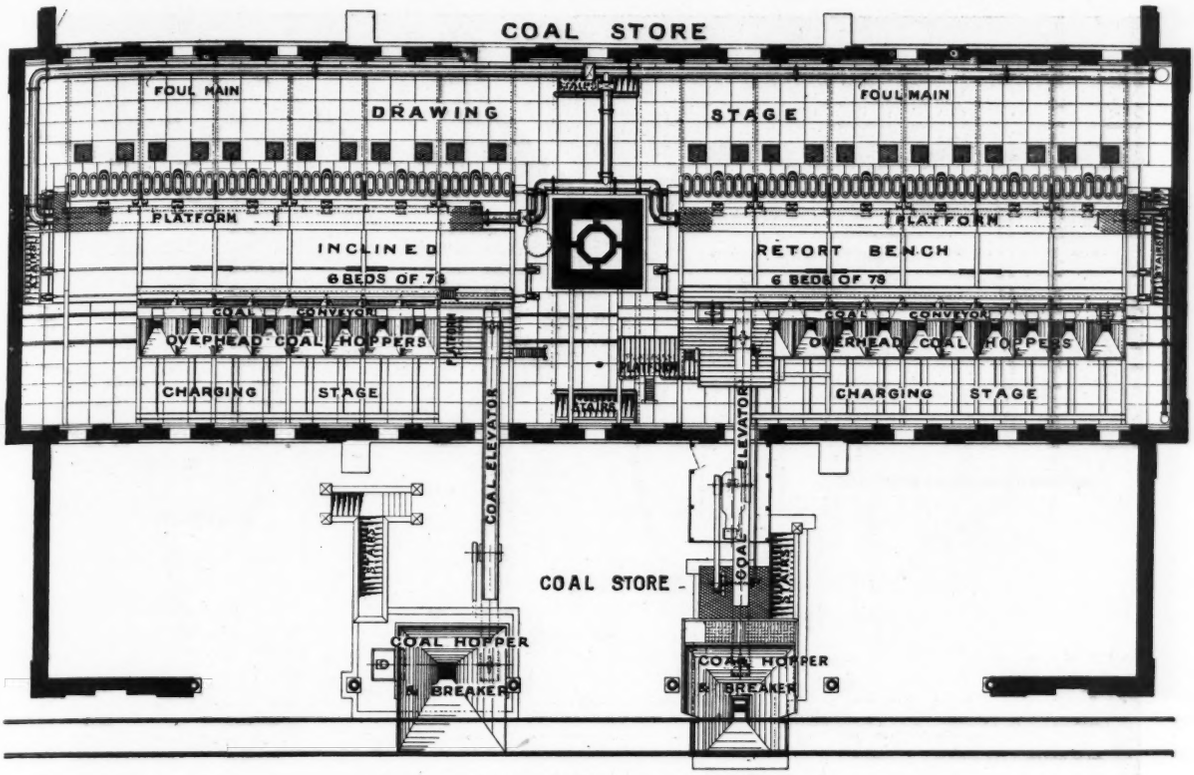
The old purifying-house contains four 22 ft. by 15 ft. purifiers, with water-lutes, fixed on a stage-floor; and there is also a catch purifier outside. The water-lutes, proving



Cross Section of the Retort-House and Coal-Stores, &c.



Ground Plan of the Chesterfield Gas-Works.



PLAN OF THE RETORT-HOUSE AT CHESTERFIELD.

insufficient in depth, in 1899 a contract was let for four 25 feet square purifiers on Green's system. These purifiers are 6 feet deep inside, and are sunk into the yard 3 ft. 10 in., and placed on concrete foundations. The purifiers are all used for lime; and they are worked by 18-inch single screw valves. Any or all of the purifiers may be run in rotation. Each purifier has four tiers of wood grids and four covers; the four openings in each of the purifiers being 8 feet square. The joint between the cover and the purifier is formed of rubber. Around each opening a double-flanged portion 6 inches high, with external flanges, is provided, bolted to the purifier cover-plates. Swing bolts, $\frac{7}{8}$ inch diameter, and spaced 3 feet apart, are arranged for securing the cover. The lifting apparatus spans the whole width of the purifiers, and runs on rails fixed to wood baulks, and is capable of lifting two covers at a time. The purifier-covers are of light construction and flat, and are fitted with air-plugs and test-taps.

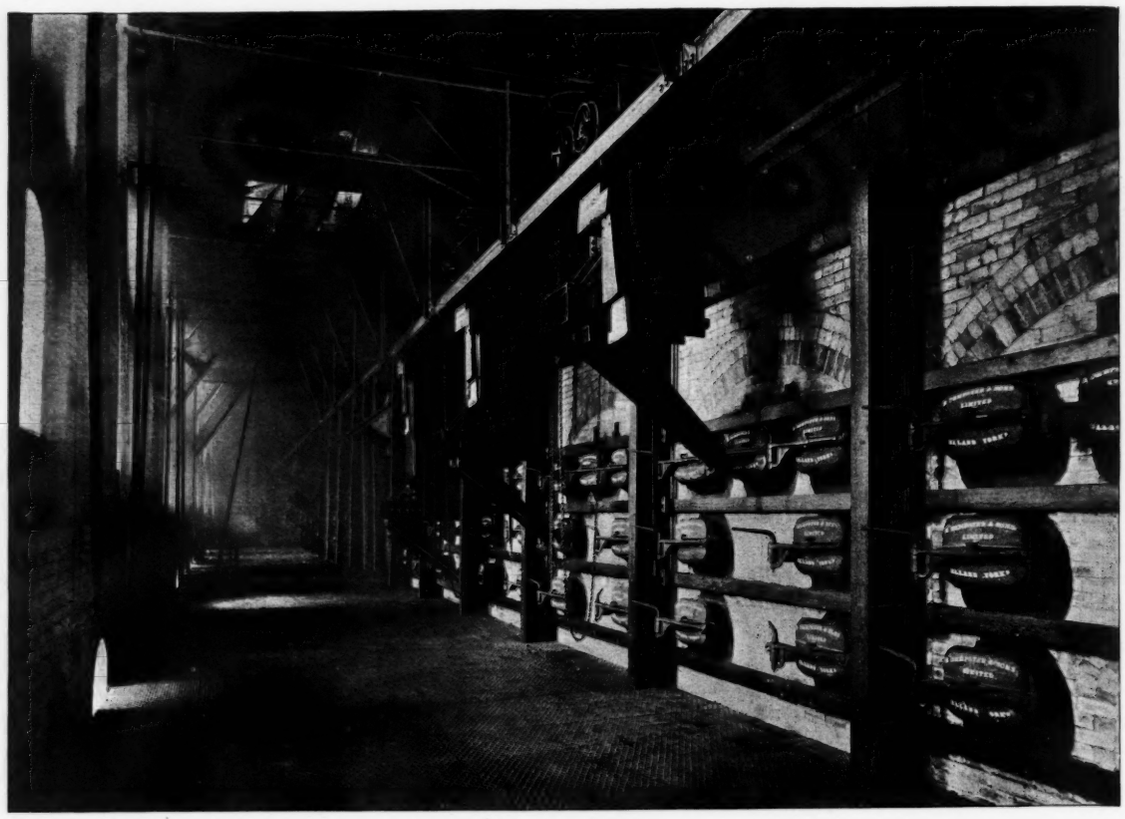
Coming to still more recent times, the gas consumption had meantime increased so rapidly that, in 1901, it was absolutely necessary to increase the storage capacity in the least possible time; and this was done by erecting a three-lift gasholder in a disused brick tank. The tank was deepened to increase the storage capacity; and the top portion of the walls and piers was taken down and rebuilt, and new holding-down bolts supplied. The holder has a capacity equal to 184,500 cubic feet. The outer lift is 63 feet diameter by 22 feet deep; middle lift, 61 feet diameter by 22 feet deep; and inner lift, 59 feet diameter by 22 feet. It has eight lattice standards, and three rows of lattice girders and diagonal wind bracing. New 18-inch inlet and outlet pipes were also put in place of the then existing smaller ones.

What was the result of all this change, so far as the manufacturing operations were concerned? The old works having been entirely discarded, gas was being made only in the inclined retorts; and the carbonizing costs (including the handling of the coal from the railway waggon, and taking the coke out to the yard) was brought down, during the periods of maximum make, to 1s. 1d. per ton. It was something like 2s. 6d. in the days of the direct-fired settings. In addition, the make of gas was increased considerably—the average production per ton was about 9800 cubic feet under the old order of things; but it has been raised to an average of 10,600 feet under the new conditions. Naturally, this experience was so satisfactory to the Board that, when last year it was essential to consider the further extension of the carbonizing plant, they without hesitation accepted the advice of their Engineer and Manager (Mr. Buckland) to duplicate the installation in the remaining half of the house. At the same time—additional storage being necessary—they decided to erect a Gadd and Mason spiral-guided holder. These two important extensions comprise the final contract in a scheme of reconstruction which, as already shown, has been of a considerable character, and which, as in the case of all the work that has preceded it, was let to Messrs. Dempster and Sons.

This second part of the work has now been completed; and last Wednesday there was an inspection by members of the Gas and Water Board, and a few neighbouring gas engineers. Unfortunately, Alderman Johnson Pearson, the Chairman of the Board, could not be present; but the members who were there were: Alderman Morton Clayton, the Chairman of the Gas Committee, the Mayor (Alderman Pearson), who is the Chairman of the Water Committee, and Councillors Wrigley, Rhodes, Jacques, Kelly, and Spooner. These, with the invited friends, made a very complete survey of the works, and particularly of the retort-house plant and operations; and no one could have been other than gratified with the action of the retorts and men.

It will perhaps be advisable to continue the description on the lines followed in the case of the former extensive work. Directly the contract was placed last year, the raising of the walls in the second half of the retort-house was put in hand. Great care was taken to properly bond the new brickwork into the old; the temporary corrugated iron gable end was taken down; and the roof was re-erected, after overhauling, and slated in and lead-flashed where necessary. The regenerator portion of the retort-bench was remodelled on up-to-date lines; and four of the furnaces were provided with Mr. Broadhead's patent corrugated tiles for the division between the waste gases and the secondary-air supply to the settings. In the other two beds, the regenerator portion consists of Waddell's patent circular fire-clay tubes. The six arches and details generally, are of the same dimensions as the previous six arches, and are 9 ft. 3 in. span clear of the walls. The pier walls are $2\frac{1}{2}$ bricks thick throughout; and the end walls $3\frac{1}{2}$ bricks thick. The regenerator portion is 23 ft. 3 in. wide, to a height of 10 feet. The body of the bench is set back 3 ft. 2 in. above the discharging-floor, leaving this 17 ft. 1 in. wide. The arches are segmental in shape, and inclined to an angle of 32°; being formed with 9 inch special fire-clay arch blocks, two rings of arch bricks above, and then filled in in the usual way. The retorts taper from 21 in. by 16 in. at the charging end to 23 in. by 16 in. at the discharging end. They are ⌂ shape, and are made in three lengths—totalling to 20 feet. The main flue is 3 ft. wide by 6 ft. 6 in. high.

It was noticed that the whole of the bracing is of a very substantial character. The front buckstays, which are carried down into the concrete foundation, are 16 in. by 6 in. rolled steel joists, the back buckstays 18 in. by 7 in., and the cross joists connecting the two together are 12 in. by 6 in. Opposite each front buckstay is a 12 in. by 6 in. vertical steel joist, attached to the main floor joists at the top, and bedded in the concrete at the bottom. A further 8 in. by 4 in. horizontal steel joist is framed into it horizontally, to brace the furnace. The end buckstays (four in number at each end) are 18 in. by 7 in. rolled steel joists, and are tied together longitudinally by means of tie-bars 3 in. by 2 in., having cover strips at the joints 6 feet long, placed on each side. The ends of these bars are forged to $3\frac{1}{2}$ inches diameter, and screwed for a length of about 18 inches, for tightening up. The back buckstays are carried up to support the hopper joists, and are stiffened in between each other under the charging-floor by a series of vertical and horizontal bracing joists.



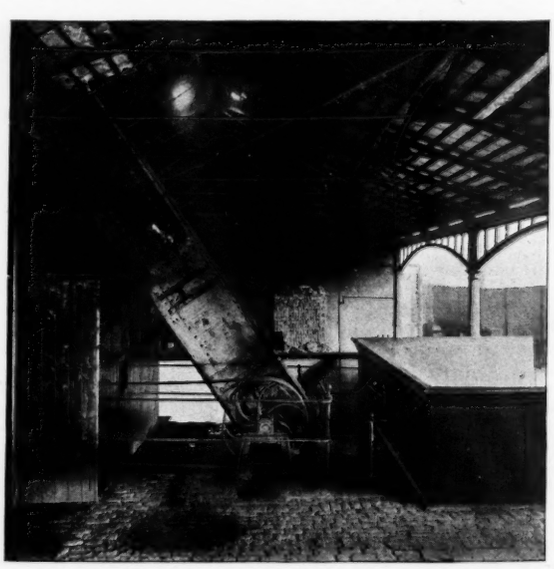
THE CHARGING-FLOOR OF THE CHESTERFIELD INCLINED RETORT-HOUSE.

As to the bench fittings, the mouthpieces are self-sealing, and are socketted on to the retorts; the space in between the socket and the retort being caulked with a suitable fireclay material—the use of retort bolts being entirely dispensed with. Each of the two upper rows of retorts is provided with wrought-iron tar-screens to prevent the tar from dropping on to the mouthpiece below. The ascension-pipes are of cast-iron, tapering from 8 inches bore at the bottom to 7 inches at the top. The arch pipes and dip pipes are also of 7 inches bore. Each hydraulic main is 2 ft. 1½ in. wide inside, 2 feet deep at one end, tapering to 2 ft. 6 in. deep at the ends where the tar is taken off. Each length of the main is provided with two large hand-hole covers. The whole of this work is carried on cast-iron cradles, supported and bolted to the cross joists. The mouthpieces are strongly braced by means of 5 in. by 4½ in. steel joists on both the charging and the discharging side. To these joists are fixed cast-iron brackets under each mouthpiece to take its weight; there being also a special strong bracing joist formed of 12 in. by ½ in. steel plate, riveted to a 5 in. by 4½ in. joist on the discharging side, to take the thrust of the arch.

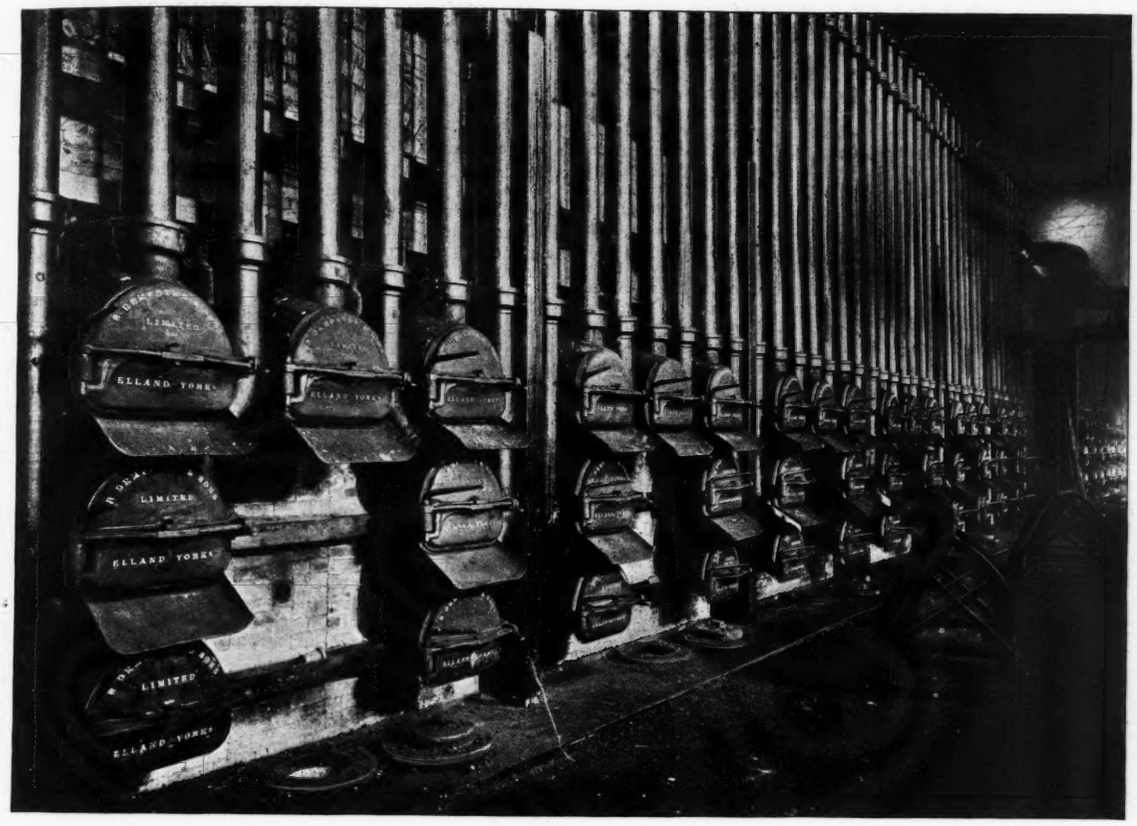
From the hydraulic mains, the gas is taken off by one 10-inch valve to each bed. This is connected to an 18-inch diameter steel foul main, which runs along the top of the bench, and joins the foul main on the other bench; and an arrangement of pipes and valves has been adapted (as shown on the plan) to enable either bench to be worked independent of the other. Immediately above the foul main on the top of the bench is arranged a platform for access to the valves and hydraulic main and pipes. The tar which gravitates towards the deep end of the hydraulic main is taken off by a 4-inch outlet from each length of main. This is coupled to a 6-inch tar-main which is carried along the top of the bench, and runs to the underground tar and liquor tank beneath the old purifiers, as previously explained.

Regarding the drawing and charging floors, these are built up of 12-in. by 6-in. rolled steel transverse joists, spanning from the front and back buckstays on to the side walls of the retort-house. Above these are six lines of longitudinal steel joists, and cast-iron chequered flanged floor-plates form a good floor. In the discharging-floor is arranged opposite each bed two openings, with wrought-iron shoots underneath, to direct the coke not required for the furnace into side-tipping coke-trucks (which run on a narrow-gauge railway on the ground floor) for conveying the coke to the yard. Four cast-iron stairways are provided from the ground to the stage-floors, and from the discharging-floor to the charging stage.

Dealing next with the coal plant, it is seen that the coal is brought into the works in railway waggons with side or bottom doors. These run over the coal-hoppers, and the coal is unloaded direct into them; the top of the hoppers being arranged to level with the rail bottom. The hoppers are of sufficient capacity to hold two to three truck loads. Immediately under the hopper [we are dealing now with the new installation only] is fixed a shaker-feed, which has a constant slow and adjustable backward and forward movement, and ensures a regular feed to the coal breaker and elevator. The coal-breaker is of the four-roller type; and the whole plant is driven by a horizontal steam-engine. From the breaker, the coal passes over a shoot into the elevator-boot, and then, by a cased-in bucket elevator, to the overhead push-plate conveyor, which distributes the coal to the overhead storage hoppers. Where the elevator head comes in the roof, a raised portion and skylight has been arranged. The overhead coal-storage hoppers are capable of holding about 50 tons, and extend over five beds (only four beds in the first installation). These hoppers are continuous, and each has two outlets for coal. They are manipulated from the charging-floor by levers in the ordinary way. The three separate charging-machines are on the Shoubridge system, fitted with Denison and



ONE OF THE COAL BREAKERS AND ELEVATORS IN THE COAL-STORES.



THE DISCHARGING-FLOOR OF THE CHESTERFIELD INCLINED RETORT-HOUSE.

Broadhead's patent weighing-machine, and arranged to weigh up to 9 cwt. As soon as the indicator lever shows the desired weight of coal, the man in charge pulls the lever, which shuts the door admitting coal into the weighing-machines. In this way, the weight of coal actually used is known. The charges are six-hour ones, and at present (in the first installation) 7½ cwt. per charge; but 8 cwt. can be easily worked. Only one man is employed on the charging-stage for the first six beds per shift, one on the drawing-stage, with two coke-wheelers and a fireman, and Mr. Buckland does not anticipate that the number will have to be increased more than one or two when the whole house is in operation. The six new beds are capable of making per day 600,000 cubic feet of gas, so that the whole house is equal to an output of 1,200,000 cubic feet per day.

The new bench was dried and ready for work at the beginning of December last; but, owing to the new holder being completed in good time, and the storage thereby considerably increased, it was not found necessary to put the bench into operation, notwithstanding the large maximum output already mentioned.

As has been explained, a spiral-guided holder (with steel tank) formed part of this final contract. It is a three-lift holder, and has a capacity of 600,000 cubic feet. The foundations were carried to a depth of 8 feet below the yard level; and, owing to the nature of the ground, a bed of concrete 3 feet thick was put down for the reception of the tank. This is 112 feet diameter by 23 ft. 6 in. deep, is formed of steel plates, and was riveted together on the site by hydraulic riveting plant. Round the top of the tank is a platform and hand-railing, and a ladder from the yard level. The inlet and outlet pipes are 24 inches in diameter. The outer lift of the holder is 110 ft. diameter by 23 ft. deep; the middle lift, 107 ft. 6 in. by 23 ft. deep; and the inner lift, 105 ft. by 23 ft. deep. The crown of the holder rises untrussed, and, when out of use, rests on a framework of timber in the tank. Each of the lifts is provided with a ladder; and around the outer edge of the dome of the holder is also a hand-railing. Each of the cups of the holder and the tank is provided with an anti-freezing arrangement; the lifts being coupled up with flexible iron armoured hose. The construction of the holder was a quick piece of work. The order was only placed on March 26 last year; and all was ready for the tank to be filled with water early in November. In addition to the two holders mentioned, there is a telescopic holder in proximity to the spiral-guided one, with a capacity of 300,000 cubic feet, and another holding 100,000 cubic feet. Therefore the works now possess the excellent total storage accommodation of 1,175,000 cubic feet.

A few general remarks in conclusion. That the money on the new works has been well spent, there can be no two opinions. The change that has been effected in the carbonizing costs, and the increase in the make per ton, are the proofs of the wisdom of the abandonment of the old system of direct firing for a more modern and approved method of working. Formerly there were seven men required per shift to produce 345,000 cubic feet of gas; now five men can make 600,000 cubic feet and more. The carbonizing costs as previously explained are now only 1s. 1d. per 1000 cubic feet as compared with 2s. 6d. under the now almost forgotten methods of working. During the inspection, it was elicited that the coal at present being used is half Nunnery, and half Rothervale and Eckington; and the average yield of gas is about 10,600 cubic feet of 17-candle power.

Anyone accustomed to gas affairs can see, without being told, that great credit attaches to Mr. Buckland in connection with the high efficiency to which the works have been brought, and for the large expansion of the business. For 25 years he has been engaged at Chesterfield; and when, on the retirement of Mr. C. E. Jones, the Board had to choose a successor, the wisdom of the selection made has its proof in the present position of their undertaking and the results. No one could have foreseen in that year, that the great idle retort-house of twenty years' standing would have, after so few years, been raised and fully equipped in order to cope with an ever-advancing consumption. But so it has been. The expeditious and satisfactory manner, too, in which the whole of the reconstruction works has from time to time been carried out by Messrs. Dempster and Sons should not pass without recognition.

The inspection was followed by a luncheon at the Hotel Portland. There were a few toasts; and what must be regarded as the principal one was proposed by Mr. R. G. Shadbolt. It was "The Chesterfield Gas and Water Board." In the course of his remarks, he said he would not enter into the question as to whether the administration of a gas undertaking was carried out better by such an authority as this, or by a corporation or company. But in their visit that day, they had evidence that the Gas and Water Board of Chesterfield, so far as the gas undertaking was concerned, were administering their affairs in what might be termed a satisfactory way, and on modern lines, and were making rapid progress such as some of them who were managing concerns under other auspices than a Board of this character would like to see. He remembered visiting the works about the time the first set of inclined retorts was in process of construction; and he was struck with the great difference that had come over the whole concern in the meantime. In the gas industry, they had now many processes and many methods of handling their raw material from the original to the finished state in the holder; and he thought it was one very sure sign of wisdom on the part of the Chesterfield Gas and Water Board to find that, having discovered that which served their purpose well, they had proceeded on the

same well-known and well-tried lines, and had moreover, sufficient faith in them to make provision for the future. In conclusion, he complimented the Chairman and members of the Gas Committee and Mr. Buckland. The toast was very cordially endorsed. Alderman Morton Clayton, the Chairman of the Gas Committee, made a happy response, and remarked upon the good fortune of the Board in possessing such officials as they had. Mr. Buckland was not, he said, at all particular as to the amount of time he put into his work; and he (the Chairman) believed his whole heart and soul was concerned in making the gas undertaking of Chesterfield a great success. There were other toasts, all of a congratulatory character. A little pleasant duty devolved upon Mr. Broadhead, in the presentation, on behalf of the Contractors, of two small souvenirs of the occasion—consisting of silver cigar cases—to the Chairman of the Board and to the Chairman of the Gas Committee. To the complimentary things said on Wednesday, we may add our congratulations to the Board on the possession of new and well-constructed works, and plant which, in the producing and storage departments, are now well ahead of present needs.

A MEMORIAL TABLET TO PRIESTLEY.

A simple but interesting ceremony took place at the Warrington works of the Richmond Gas Stove and Meter Company, Limited, last Saturday week. On that day, Dr. Thorpe, F.R.S., Director of the Government Laboratories in London, unveiled a memorial tablet to Joseph Priestley in the presence of the members of the Warrington Society and a large number of literary and scientific friends.

The house occupied by Dr. Priestley during his stay in Warrington is now used as offices by the Richmond Company. The Warrington Society have long wished to pay some tribute to the memory of the great teacher and philosopher, and, by the courtesy of the Directors of the Company, they have now been able to carry this into effect by erecting a memorial tablet on the front wall of his former residence. The tablet is in bronze, and

represents a medallion of Priestley and the inscription: "Joseph Priestley, Natural Philosopher, resided here from 1761 to 1767. This tablet was erected by the Warrington Society on the Centenary of his death, 6th February, 1904." Priestley is chiefly known to fame as the discoverer of oxygen; but it is said that science and chemistry were to him matters of recreation, and that theology was his serious work.

The designing and modelling of the tablet were entrusted to Mr. W. H. Sherburn, who was highly complimented on the artistic character of the design, and the manner in which it is worked out. Acknowledgments were also made to the Richmond Gas Stove and Meter Company, Limited, for permitting it to be moulded and cast in their works.

In a letter received from Mr. J. W. Helps, dated Jan. 25, he stated that he hoped to leave Bombay on his return journey, in the "Marmora," on the 6th inst.; so that, unless anything occurred at the last moment to induce him to alter his plans, his many friends may hope shortly to see him back in England.

Advantage was taken at the annual meeting last Tuesday of the Sick Club in connection with the Langley Mill Gas Company to make a present of a handsome timepiece to Mr. William Prince, who has recently left the employment of the Company to take charge of the Etwall and Mickleover Gas-Works. Mr. John Andrews, the Engineer and Manager, made the presentation on behalf of the workmen; and Mr. Prince suitably responded.

MOISTURE AND CONDENSING GAS-STOVES.

Communicated by Mr. F. R. E. Branston.

When a condensing gas-stove, in operation, is shown to emit vapour from any of its component parts, proof is at once given that it is working beyond its capacity, and that it is no longer of hygienic value. The condensed liquid arising from the combustion of the hydrogen and hydrocarbons in the gas, will then be found to decrease in proportion to the gas consumed; and the sulphur compounds in the liquid or water will decrease in like manner, as the products of combustion are then carried off into the air with the vapour or moisture arising from the stove.

That there is no unpleasant odour arising from the combustion of gas in a condensing gas-stove is no proof that the products of combustion are not escaping into the air. The best means of discovering if the vapour is escaping, and if the atmosphere is being vitiated, is to detect the vapour by means of a hand glass; and when this is done, it will be found that the vapour escapes from different stoves in different parts of the stoves; and if no adequate means are adopted for dealing with the vapour, the light will be put out by the products of combustion which rise with the vapour and fall on the burner. Another proof is to measure the condensed liquid or water, when it will be found that—instead of increasing in proportion to the larger quantity of gas consumed—it will decrease; and as the condensed liquid decreases, so the vapour will be found to increase, taking with it the products of combustion which vitiate the air.

The question of dealing with the vapour is the most important consideration in the manufacture of condensing gas-stoves, as it has been shown that, if it is ignored, the light will be put out, and if allowed to escape, the air becomes vitiated by the products of combustion. If the vapour is not condensed, the right amount of liquid is not obtained; the latent heat from the gas is not all given up, and the analysis will not show the correct quantity of sulphur compounds which should be found in the condensed liquid when the stove is working within its capacity. A stove which will condense the products of combustion from 6 cubic feet per hour, and deal with them in a satisfactory manner, without producing vapour, will be found on burning 9 cubic feet of gas per hour (if it then produces vapour) to separate less sulphur in proportion from the gas than the 6 cubic feet. This proves that a small portion of the products are dealt with, and that the rest are allowed to escape into the air; or, to put it in another way, the action of condensation on the 6 cubic feet is impeded, and will not show such good results, while the products of the combustion of the remaining 3 cubic feet of gas consumed are not condensed, but merely turned to vapour, which escapes from the stove.

The first condensing gas-stoves that were made had no provision for the escape of the vapour, but being very large, and fitted with sheet-iron tubes, having an inside tube through which the air was allowed a free passage, they were quite within the necessary capacity for dealing with a small quantity of gas. But when the size was decreased, a different arrangement with regard to the iron interior tubes was resorted to; and when vapour was formed, provision was made that it might escape from them into the air. A subsequent form was made, which discarded the inner side tubes, with the air passing through them, and carried the vapour up the back of the stove, into the centre tube over the burner, where it was heated before leaving the stove and mixing with the air. I think this was advertised as a condensing gas-stove "giving a nice moist heat." Subsequently, the same sort of thing was done with a coil, and other methods were resorted to—such as making the aperture at the base of the stove larger, when the vapour was found to condense on the outside of the base, and drip on the floor, when it escaped in that way. Nearly all the stove makers have tried to construct these stoves, without being able to overcome this difficulty of the products of combustion escaping with the vapour. When the vapour is allowed to escape, it naturally follows that the carbonic acid gas also escapes, as the pressure is decreased, and the condensed liquid is decreased. Water will hold its own volume of carbonic acid gas, as this gas is not condensed, but is acted on by pressure, and is found in the water when the stove is working within its capacity. In some cases, the makers would have us believe that their stoves produced a small pailful of liquid in 24 hours; but half the quantity named on the circulars would be all that it would be possible to obtain from the gas which is consumed in their stoves, and about a quarter of what they state is what is found when the stoves are tested.

The competition in these stoves has been keen, and the quantity of gas which could be properly condensed (to deal perfectly with the products of combustion) was small in comparison with the size of the stove; so that they were costly to make. Consequently, the temptation to the makers to send out stoves burning more gas than they were competent to thoroughly condense was great; and large numbers of imperfect stoves of this kind have been sold, and are now constantly met with.

Under the foregoing circumstances, it is not a matter for much wonder that Professor Lewes, in his Cantor Lectures delivered about a year ago at the Society of Arts, should have expressed such a poor opinion of the condensing gas-stoves that had up to that time come under his notice, and the defects of which were well known to him. I have learned, however, from men of

science both in this country and abroad, that wholesale condemnation of a useful system, without any suggestion for improvement, does not advance mechanical knowledge. Up to this period, the makers seem merely to have endeavoured to carry out in the stoves what they saw take place in a room, when overheated with ordinary gas-burners. The products of combustion were cooled, by coming in contact with the cold walls and the glass of the windows, moisture was seen to be formed, and they were satisfied with merely disposing of the troublesome vapour, by allowing it to escape from the stove—taking with it a large portion of the products of combustion.

The improvements which have recently been made in this system of condensing gas-stoves go much more carefully into the question of following out the natural action which governs the gradual condensation, and which produces liquid from heated gases, as it not only carries out roughly the action which is brought about as regards condensation when a room is overheated by gas consumed with ordinary burners, but it performs three distinct actions which are constantly taking place in the atmosphere. It also performs these three actions all at the same time, in a very small space, dealing with the vapour according to the natural laws of evaporation, vaporization, and condensation, without allowing any of it to escape into the air.

In this apparatus, the first thing that is aimed at is to produce as much vapour as possible, and then to make use of it. The combustion products or gases rising from the gas consumed by the burner form vapour, which rises in the same manner as the heat rises from the earth to form clouds. The vapour is drawn off, or induced into separate tubes from below, as the air in them is warmer than the base (in like manner that the mist or vapour rises from the earth, when the air is warmer than the earth); and when the temperature of the air is increasing, its capacity for holding vapour increases. Then, when the air is saturated with vapour, it deposits moisture on becoming cool, forming dew or rain. This action takes place in the cool part of the outside columns, and in this manner the moisture or water is formed which carries with it the sulphur and other impurities.

There is another action which takes place in these stoves, which has its counterpart in the natural action that is constantly taking place in the atmosphere. Evaporation never takes place without the evolution of electricity; and when the electric current is withdrawn, globules of rain are formed. The electric current formed in this manner in the stove passes out with the radiant heat, when the vapour is condensed into a state of water; and I have found a considerable current produced in this manner, which, with thermo-electric instruments I constructed for the purpose, according to the tests I made, appears to give about 1 volt for every cubic foot of gas consumed in the stove.

AN INTERESTING EXPERIMENT.

In a recently published collection of "Science Notes" in the "Daily Telegraph," the following paragraphs appeared.

When a newly-discovered property of matter, radio-activity, commands universal attention, any simple demonstration of this principle may be welcome. In its wonderful qualities, radium is associated with uranium and thorium, two not very abundant metals. It so happens, however, that 99 per cent. of the mineral constituents of the Welsbach incandescent mantles consists of thorium; and, in consequence, the mantles are radio-active. It is not meant that it is because of this property they give out their brilliant white light; it means that, like radium, they are always, in the dark as in the light, scattering forth invisible radiations. There is a simple test which anyone who possesses a photographic plate may try: Lay a mantle, or portion of one, upon an unexposed dry plate; put it in a dark room, or in a box—from which the light is excluded; allow an exposure of forty-eight hours; and at the end of that period, on developing the plate, a faint but distinct image will be found of the mantle—a picture formed by contact with the radio active thorium.

It ought to be an encouragement to young chemists to prosecute research to be told that uranium was discovered in 1789, and yet it waited for over one hundred years for M. Becquerel and Madame Curie to find that it held concealed within it the precious radium, at this moment many hundreds of times dearer than gold. Another example meets us in our incandescent gas-mantle, which owes its luminosity to only 1 per cent. of cerium. In an encyclopædia published in 1881, it was said: "Cerium is not obtained in any quantity, and is, therefore, not employed in any manufacture." Again, of thorium, which has done inestimable service in the investigations of Professor Rutherford and Mr. Soddy, it was written: "None of the compounds of this metal are of any practical importance!" There is a sand known as monazite, from which thorium is obtained; and last year the South Metropolitan Gas Company sent agents to Brazil to prevent the Government of that country putting into the hands of a greedy trust their monazite sands. It would have been a disaster if such a monopoly had been thus thrust on the world. Possibly tribute would have been levied on every consumer of gas by that trust. We come once more by these examples to Boyle's old lesson that "There is no one thing in Nature whereof the uses to human life are fully understood."

THE JUNIOR INSTITUTION OF ENGINEERS.

A Suggestion for the Education Committee of the Institution of Civil Engineers.

The Junior Institution of Engineers has not yet attained its majority; but it is one of the finest illustrations of wonderful progress and success of united effort in improvement in professional technic among young men that, we make bold to say, is to be found in this country. What has been done by them was recently traced in a special article in the "JOURNAL." Last Saturday, the Nineteenth Anniversary was celebrated by a dinner at the Hotel Cecil; and, including guests, some 150 were present. The President (Mr. J. Fletcher Moulton, K.C., F.R.S., M.P.) was in the chair. On his right was the Right Hon. Lord Balfour of Burleigh, and on his left Captain Sir Andrew Noble, Bart., K.C.B., F.R.S. The engineering profession was represented by members of the various Institutions, notably by Mr. H. E. Jones, the President of the Institution of Gas Engineers, Mr. R. Kaye Gray, the President of the Institution of Electrical Engineers, and Professor D. S. Capper. Mr. Samuel Cutler was also present, as was the gentleman bearing that patronymic who is the Chairman of the Junior Institution. In addition to the Chairman, the legal profession was represented by Mr. H. T. Eve, M.A., K.C., M.P. The occasion was typical of the record of the Institution—a great success. Several toasts were proposed; but we cannot do more than notice a few of the remarks that have application to the special interests in which the "JOURNAL" is concerned.

A smart and suggestive speech was made by Mr. Kenneth Gray (one of the members) in putting the toast of "The Senior Institutions." He pleaded for a branch of engineering that he is afraid is much neglected. He said he understood that a Committee had been formed by the Institution of Civil Engineers to inquire into the subject of the education of young engineers. The branch of engineering that he had in mind, and for which he sought consideration, was that of heating and ventilation. It was a strange thing that young men could not, through the ordinary channels, learn anything about heating and ventilation in England. In other countries, there were eminent scientific men who were teaching in this line; while in this country he did not think there was a single technical college or school of any sort where the subject was taught. He wanted the Committee that had been formed to consider the advisability of including this subject in the curriculum of the young engineer. Engineers were continually being brought into contact with work of this kind that had been disgracefully done; and he was sure the suggestion, if adopted, would confer a great benefit on the students and the public generally.

In the course of his reply to the toast, Mr. R. Kaye Gray stated that he believed almost all branches of engineering would be represented on the Committee that had been formed by Sir William White; and he had no doubt the matter referred to by Mr. Kenneth Gray would be brought under consideration. One thing he should advocate on the Committee would be that, in any recommendations made, there should not be too much standardization. The making of strong rules which could not be broken was a bad thing; and this was one of the dangers the Committee would have to avoid. In this country, the greatest element in its success was the individuality of its people.

Lord Balfour of Burleigh honoured the Junior Institution by proposing the toast that is summed up in its title; and his Lordship addressed some very encouraging words to the members. In his response as Chairman of the Institution, Mr. Samuel Cutler, jun., said the members could not but regard the circumstance of the toast being proposed by Lord Balfour as a distinct compliment. To receive the good wishes and expressions of encouragement from a gentleman of such high position and distinction was very gratifying to them all. The scope of the work of the Institution had been referred to by the President, and one thing the members did pride themselves upon was that they were never still. They were always trying to move forward; and their nineteen years of success conclusively proved this was so. New proposals were constantly engaging the attention of the Council; and one of the matters under consideration now was the enlargement of the interests of the Institution in the Provinces. There was no matured scheme in this regard before them yet; but, for the first time this session, they had elected eight members from the Provinces. He hoped this would bear fruit in the way indicated. The members were deeply sensible of the inestimable help they always received from their Presidents (of whom they had a long line of great eminence), and of the assistance that was rendered to them by the Technical and Daily Press and by those manufacturers who opened to them their works for inspection. Among his last words (emphasized beyond dispute by applause) were: "The man who has made this Institution a success by his powerful organization is our Secretary, Mr. Dunn."

Several other toasts were honoured; the final one, over which there was a great deal of enthusiasm, being "The President." Music and recitation supplemented the several other enjoyable events of the evening; and with "Auld Lang Syne" the members parted from their distinguished guests to face the work which the year that will bring them to their twentieth anniversary has in store for them.

SOME EXPERIMENTS ON THE INTRODUCTION OF WATER-GAS INTO COAL-GAS RETORTS.

(*Concluded from p.* 338.)

The analytical results recorded in Table II. show that the coal gas made in the author's trials was not of high quality; but the yield of gas was satisfactory. The quantity of water gas introduced, being different for each trial, was controlled by the main cock only, and, consequently, the admission of water gas did not begin until all the retorts in the setting were charged. Hence carbonization went on in the retort first charged for some minutes before water gas was introduced, and destruction of the hydrocarbons doubtless occurred in the gas evolved during this time. The first trials were made with charges averaging 287 lbs. per retort; but it was found that they took a long time to work off unless the heats were exceptionally high. On the 18th and 19th, the heats were low, and the outer retorts in the bottom tier were especially cool. In subsequent trials, no water gas was admitted to these two retorts, because they remained less highly heated than the rest, and it was believed that the coal gas produced in them passed away without having its quality injured by excessive heat. As from June 20 the water gas introduced did not pass through these two retorts. The proportion that passed through the remaining four was thereafter greater by about one-third than the figures that are given in Table II. would indicate if applied directly in calculating the average per retort for the whole setting of six.

TABLE II.

Date of trial . . . . . June	19th.	22nd, a.m.	21st, p.m.	18th, a.m.	20th.	21st, a.m.	22nd, p.m.	18th, p.m.
Weight of charge per retort . . . . . lbs.	287	202	202	287	283	264½	202	287
	Nearly Bright Orange.	Bright Orange to White.	Bright Red.	Very Bright Orange, falling to Bright Red.	Feeble Bright Red.	Very Bright Orange.	Bright Orange to White.	Bright Orange.
Temperature of oven—estimated . . . . . deg. C.	1050	1250	950	1200—1050	900	1208	1250	1150
Charge completely worked off in . . . . . min.	370	280	263	363	415	288	228	320
Make of coal gas per ton of coal . . . . . cub. ft.	10,530	11,050	9,592	11,135	9,475	10,700	10,945	11,300
Proportion of make blown off . . . . . per cent.	10·0	5·8	2·4	9·5	1·5	2·8	2·5	1·5
Water gas added per 100 cubic feet of coal gas collected in holder . . . . . cub. ft.	42·3	34·33	33·17	24·83	22·0	18·28	—	—
Duration of admission of water gas . . . . . min.	98	65	60	70	49	67	—	—
B.T.U. in the gas obtained per ton of coal carbonized	6,015,750	6,794,000	5,409,000	6,690,000	5,824,000	6,503,000	6,310,000	6,451,000
Composition of the mixed gas passed into the holder—								
Carbonic acid . . . . . per cent.	3·60	3·44	3·49	1·83	3·16	1·77	2·00	1·86
Hydrocarbons . . . . . ,,	1·10	2·60	2·10	2·30	2·35	2·68	3·59	3·57
Carbonic oxide . . . . . ,,	17·30	12·40	14·15	11·38	11·17	11·76	10·09	8·56
Hydrogen . . . . . ,,	52·20	55·60	55·34	53·00	54·99	54·60	54·55	55·73
Marsh gas . . . . . ,,	22·40	23·00	20·55	26·05	26·60	26·00	25·62	25·82
Nitrogen . . . . . ,,	3·40	3·00	4·37	5·45	1·37	3·19	4·15	4·66
Net calorific power of mixed gas . . . B.T.U. per cubic foot	445	485	452	492	507	506	519	512
Average composition of the water gas introduced—								
Carbonic acid . . . . . per cent.	5·1	4·5	4·5	5·0	5·1	4·5	—	—
Carbonic oxide . . . . . ,,	35·8	35·4	37·5	38·0	38·5	37·5	—	—
Hydrogen . . . . . ,,	54·0	54·2	53·2	52·0	51·5	53·4	—	—
Marsh gas . . . . . ,,	0·5	0·7	0·3	0·5	0·7	0·3	—	—
Nitrogen . . . . . ,,	4·6	5·2	4·3	4·5	4·2	4·3	—	—
Net calorific power of the water gas . . B.T.U. per cubic foot	285	284	288	287	—	285	—	—
Composition of the coal gas obtained—								
Carbonic acid . . . . . per cent.	2·99	3·07	3·15	1·05	2·75	1·28	2·00	1·86
Hydrocarbons . . . . . ,,	1·55	3·66	2·86	2·82	2·87	3·16	3·59	3·57
Carbonic oxide . . . . . ,,	9·55	4·13	6·34	4·80	5·18	7·06	10·09	8·56
Hydrogen . . . . . ,,	51·40	56·25	56·00	53·13	55·87	54·90	54·55	55·73
Marsh gas . . . . . ,,	31·65	31·00	27·27	32·42	32·35	30·62	25·62	25·82
Nitrogen . . . . . ,,	2·86	1·89	4·38	5·72	1·17	2·98	4·15	4·66
Net calorific power of the coal gas . . . B.T.U. per cubic foot	520	555	507	544	550	546	519	512

The value of the process must be judged by reference to the heating value or amount of light obtainable from unit-weight of coal carbonized, and not by consideration of the calorific value or illuminating power of a cubic foot of the gas. On June 18 and 22, water gas was introduced in the morning but not in the afternoon trials; while the retorts were kept at virtually the same heats throughout each of these days. The most favourable results of the process were obtained on these two days; and it is noteworthy that the yield of coal gas was rather greater when water gas was admitted than when it was not (*vide* Table II.). Consequently, there is actually no falling off in the volume of gas obtained from the coal owing to the admission of the water gas. Notwithstanding the exceptionally high heats used on several occasions, no stoppages of the ascension pipes nor sooty deposits resulted throughout the week, though Ruhr coal carbonized in the ordinary way at high temperatures would, towards the end of a week, have certainly produced at least some deposits of hardened tar in the ascension pipes. Consequently, it may be assumed that high heats may be used with the self-carburetting process without fear of stopped ascension pipes.

The proportion of coal gas made which was blown off varied from 1·5 to 10 per cent. (Table II.); but in order to put all the heating values of the gas obtained per ton of coal on a common basis, they have been calculated on the assumption that 2½ per cent. of the coal gas made was blown off in all the trials. It is to be observed that with the self-carburetting process, whether much or little water gas is admitted, the yield in heating value is, as in ordinary coal-gas production, less at low heats than at high ones. In both cases the falling off in the quantity of gas obtained is not compensated for by the gain in calorific power at low heats. It can further be seen from Table II. that there is no relation between the quantity of water gas introduced and the gain in heating value. On referring to the temperature, however, it will be found that the heating value realized per ton of coal rises and falls with the heat of the setting, or that the results of trials are only strictly comparable when they are conducted at approximately the same heats. Thus the two trials made on June 18, one with and one without admission of water gas, are comparable; and it will be seen that self-carburetting here shows a gain of nearly 240,000 B.T.U. per ton of coal carbonized, or of 3·7 per cent.* in the heating value of the gas produced. In these two trials, the temperature averaged about 1150° C. At lower temperatures, the trials made on the 20th and in the afternoon of the 21st are comparable; and it will be seen that the admission of the larger (49·8 cubic feet) proportion of water gas gives a reduced yield in heating value as compared with the lower proportion (33 cubic feet per 100 cubic feet of coal gas). Further, it is clear that at the lower temperatures of these trials the self-carburetting process affords no better return in heating value than carbonization in the ordinary way.

The results obtained on the morning of the 18th and on the 19th of June show that, as soon as the heats are increased, an increase in the heating value realized is secured, even with a relatively small introduction of water gas. The two trials on the mornings of the 21st and the 22nd demonstrate further that at very high temperatures the effect of the self-carburetting process is very good, and increases with an increase in the proportion of water gas introduced. These two trials are comparable in respect of temperature with the trial on the afternoon of the 22nd, when water gas was not employed. On the 21st, with 27·5 volumes of water gas per 100 of coal gas produced in the four retorts to which water gas was admitted, the gain in heating value per ton of coal carbonized was 193,000 B.T.U., or at the rate of 3* per cent.; and on the 22nd, with 51·6 volumes of water gas, the gain was 484,000 B.T.U., or 7·7 per cent., as compared with the result of the trial without water gas on the afternoon of the 22nd. These gains are plotted in curve II. of the diagram given in the "JOURNAL" last week (*ante*, p. 338); and it appears therefrom that the gain in heating value increases with the amount of water gas admitted and with rise in temperature. It is, of course, possible that, with a proportion of water gas lying between the 27·5 and 51·6 volumes per 100 volumes of coal gas, a still more favourable result would be secured.

The trials show, so far as the proportion of water gas is concerned, very similar results to those obtained by Herr Borchardt and Professor Lewes, but with the difference that the effect of the process is considerably lower than they found. The reason of this difference doubtless lies in the poorness of the coal used by the author, because, when only few hydrocarbons are produced, but few can be preserved in the gas. Trials with cannel coal would be very instructive, as it would probably be found in many cases that carburetting with benzol could be avoided. It has

* This is 2·7 in the original. Compare the diagram given last week, p. 338, Curve II.

* This is 3·3 in the original. Compare the diagram given last week p. 338, Curve II.

been pointed out that the time during which water gas is introduced must not exceed a certain limit; and the author finds from these trials that, within the practicable limits of this time, it is immaterial whether it is long or short. The preponderating factors are the temperature and the quantity of water gas introduced. Calorimetric tests of the gas in the holder, made by a Junkers calorimeter, were found to be unsatisfactory, as four tests on the same sample showed quite discordant results, which, moreover, were different from the calorific power calculated from the composition of the gas. The calorimetric tests were therefore disregarded. It is probable that the quantities of gas consumed in the tests were too small.

It is characteristic of the self-carburetting process that the evolution of coal gas falls as the admission of water gas is increased, and rises as it is decreased. When the admission of water gas is stopped, the evolution of coal gas usually increases somewhat, then remains constant for some time, and finally gradually falls off. These phenomena are interesting, because they elucidate the action of the self-carburetting process. It is, for instance, conceivable that the inflow of water gas diminishes the decomposition of the hydrocarbons, and thus decreases the make of coal gas. But, on the other hand, it has already been shown that there is no such decrease in the make; and, consequently, the above-mentioned phenomena cannot be thus accounted for.

It might be assumed that in consequence of the somewhat higher pressure caused by the admission of water gas, the evolution of gas from the coal is to some extent restrained; but the author is not aware of any observations bearing on this point. It is, further, conceivable that the inflow of cold water gas causes a temporary cooling of the retorts, and thus hinders the evolution of coal gas. If this were the case, the time required to work off the charges would be extended. As a fact, the trials made without water gas showed a somewhat shorter carbonizing time. But the water gas cannot carry off any considerable amount of heat from the retorts, as a little consideration will indicate. An addition of 50 cubic feet of water gas per 100 cubic feet of coal gas means, with charges of 397 lbs. of coal and a bed of nine retorts, that 8830 cubic feet of water gas are used, and that 4415 cubic feet are admitted in one hour every $2\frac{1}{2}$ hours. Assuming that the temperature at which the gas escapes is between 400° and 500°C., there is a loss of heat by reason of the water gas of about 60,000 to 72,000 B.T.U., which would be afforded by a consumption of $\frac{3}{4}$ to $\frac{1}{2}$ lb. of coke per 100 lbs. of coal carbonized in the setting. Thus only a negligible amount of coke would be consumed above the ordinary quantity every 2 to $2\frac{1}{2}$ hours in consequence of the admission of water gas. The retardation in the evolution of gas could only be caused by sudden local cooling within the retorts; and this cooling can be compensated for by the somewhat higher heat of the setting. It has been shown that a higher temperature is admissible—and, indeed, desirable—in the self-carburetting process. The quantity of coke available for sale will be reduced by 0·7 to 0·9 per cent.

The heavy hydrocarbons in the gas obtained are in small proportion; and, consequently, the illuminating value of the gas, when burnt in flat-flame and argand burners, is only moderate, but is, speaking broadly, as high as that of the coal gas obtained without the introduction of water gas. The mixed gas showed a somewhat higher illuminating duty in incandescent burners. The gas produced was tested on the photometer at frequent intervals as its production proceeded; and it was observed that the illuminating power fell when the admission of water gas was commenced, varied more or less with the quantity admitted, and rose when the water gas was shut off.

The conclusions which may be drawn from the researches of Lewes, Borchardt, and the author may be stated thus—

(1.)—The admission of water gas must take place as soon as possible after the retorts are charged, and must not be extended beyond a certain time, which has still to be determined by experiment for each class of coal.

(2.)—A particular quantity of water gas introduced appears, with each description of coal, to act most favourably in preserving the hydrocarbons. This quantity lies between 40 and 50 cubic feet of water gas per 100 cubic feet of coal gas.

(3.)—The gain in hydrocarbons appears to rise with the temperature of the retorts.

(4.)—If, as is probable, higher heats may be employed than in ordinary carbonization, the greater consumption of fuel entailed in the producer is completely set aside by the higher return in heating value. The effect of the process, even at normal heats, appears from the trials of Borchardt and Lewes to be good when good coal is employed.

(5).—The duty realized by the process increases as the quality of coal carbonized is better. Thus 13 to 15 per cent. was gained in heating value with good English and Westphalian coals, but only 5 to 8 per cent. with poor coal. This tallies with the present conception of the action of the water gas.

(6).—Trouble occurs in the use of present types of gas appliances (heating apparatus, motors, &c.) when 55 volumes and upwards of water gas are added per 100 volumes of coal gas.

(7).—When 40 to 50 volumes of water gas are added, an addition of 40 to 50 oz. of benzol per 1000 cubic feet of water gas suffices to produce a gas which has a calorific power of only 11 to 17 B.T.U. per cubic foot below that of coal gas as at present supplied.

Finally, it may be pointed out to what extent the consumption of coal and the quantity of coke available for sale are affected by the introduction of the self-carburetting process. Table III. shows the principal data for additions of water gas ranging by increments of 5 from 20 to 50 volumes of water gas per 100 volumes of coal gas. The transport of coal and coke also becomes greatly diminished as the proportion of water gas introduced is increased.

TABLE III.

I. Volumes of Water Gas admitted per 100 Volumes of Coal Gas. II. Coal required in Percentage of the Quantity needed for Producing the Same Volume of Coal Gas only. III. Coke Produced in Percentage of the Quantity Produced in Making the Same Volume of Coal Gas only. IV. Coke Consumed for Making Water Gas in Percentage of the Production when the Same Volume of Coal Gas only is Made. V. Coke available for Sale in Percentage of the Production when the Same Volume of Coal Gas only is Made.

I.	II.	III.	IV.	V.
Nil	100·0	100·0	—	100·0
20	83·3	83·3	6·5	77·0
25	80·8	80·8	7·8	72·2
30	77·0	77·0	9·0	68·0
35	74·0	74·0	10·2	63·8
40	71·4	71·4	11·2	60·2
45	68·9	68·9	12·1	56·8
50	66·6	66·6	13·0	53·6

The mixed gas obtained by the self-carburetting process should be produced rather more cheaply than coal gas, as the following calculation will indicate: (1) Coke consumed for gas making and raising steam, 50 lbs. per 1000 cubic feet, costing, at a price of 17s. 3d. per ton, $4\frac{1}{2}$d. This charge would be reduced if breeze were used in the boiler-furnaces. (2) Wages, with one generator having a productive capacity from 5300 to 17,500 cubic feet per hour, about 1d. per 1000 cubic feet. This makes a total for fuel and wages of $5\frac{1}{2}$d. One man could serve two generators, so that the wages charged would be less when more than one generator was used. (3) Benzol, say 45 oz. per 1000 cubic feet, costing about 3·8d. There is a prospect of a reduction in the consumption of benzol. (4) A water-gas installation, comprising a generator having a nominal capacity of 5300 cubic feet per hour, with self-carburetting apparatus, buildings, and accessories, but excluding a gasholder, costs about £4500, and may be worked up to an output of 35 million cubic feet per annum. At 8 per cent., interest, depreciation, and maintenance amount to about $2\frac{1}{2}$d. per 1000 cubic feet made. With plant of a capacity of 17,500 cubic feet per hour, these charges fall to about $1\frac{1}{3}$d. per 1000 cubic feet.

Compared with coal-gas manufacture, the saving in the cost of raw material is 1d. per 1000 cubic feet under unfavourable, and $2\frac{1}{2}$d. under favourable, conditions. All other charges are considerably lower; so that the cost of (benzol) carburetted water gas in the self-carburetting process becomes from $3\frac{1}{2}$d: to 5d. less per 1000 cubic feet than that of coal gas. In most cases, the water-gas installation would prove remunerative if erected under ordinary conditions; but it becomes specially profitable when an extension of the retort-house, or the building of a new retort-house, is avoided by the introduction of mixed gas, as the productive capacity of a gas-works can be raised by one-half at a small expenditure by adding water-gas plant for self-carburetting. There remains much to be done in the way of researches on the coals that are best adapted for employment with the self-carburetting process, and on the most favourable working conditions for the process.

HIGH-PRESSURE GAS DISTRIBUTION.

Our American contemporaries have recently given a few particulars of a gas-power installation of unusual interest which is now under construction by the Laclede Gas Company, of St. Louis. The system has for its object the more efficient distribution of gas over larger areas than may be economically covered by the simple method of running large low-pressure mains from centrally located gas-works; and it is intended to supply the entire city of St. Louis, embracing an area of approximately 65 square miles. In order to serve the outlying districts of such an area, one of three methods must be employed. First, a large low-pressure feeder from the central holder to the centre of the district to be covered; secondly, medium-size feeders from the main holder to the auxiliary holder in the centre of the district; and, thirdly, a high-pressure feeder to the distributing centre, using pressure-reducing valves at this point for obtaining proper pressure upon the service lines. The enormous expense for construction entailed by the first two methods practically prohibited their use in St. Louis; and the adoption of the high-pressure system is the result. With it, the size of the feeder pipes is greatly reduced, and the necessity for auxiliary district holders is entirely done away with.

The pressures to be employed in the system under construction at St. Louis are approximately 5 lbs. per square inch for the medium-pressure feeders, and from 20 lbs. to 80 lbs. per square inch for the high-pressure suburban feeders. On account of the use of cast-iron mains, the 5 lbs. limit was chosen for the medium-pressure system; but for the high-pressure system iron pipe with

screwed fittings will be employed. In the medium-pressure system, the gas pressure will be supplied by a blowing unit, consisting of a Connersville blower direct-driven by a 300-horse power Westinghouse horizonal gas-engine. It has two double-acting cylinders, 16½ inches in diameter, and a 24-inch stroke; the cylinders being arranged in tandem with a single crank. The engine uses for fuel ordinary illuminating gas, and draws its supply directly from the main. It operates on the four-stroke cycle, and the method of governing secures a constant quality of explosive mixture at all loads; the quantity of mixture being proportioned by the governor to the load on the engine. Electric ignition is employed. In this particular installation, the engine is controlled by an automatic pressure governor, which adjusts the speed of the unit in direct proportion to the demand for gas; the speed thus being in inverse proportion to the pressure in the distribution main. It is stated that so sensitive is this control that the variation in pressure will not exceed 8 oz. for a 50 per cent. range in gas output. The regular centrifugal speed governor is, however, also used, in order to prevent, under any conditions, the engine running at excessive speed.

Though the distribution of natural gas at high pressure has for some time been in successful use, the St. Louis installation is one of the first in which the system has been applied to ordinary illuminating gas. It presents several interesting features, which we hope to notice when the work is complete. The installation has been placed under the control of Mr. W. A. Baehr, the Engineer of the Laclede Gas Company.

SOCIETY OF ENGINEERS.

The First Ordinary Meeting of the Society for the present year was held on the 1st inst., at the Royal United Service Institution, Whitehall. Mr. J. Patten Barber, the President for 1903, first occupied the chair, and (after distributing the premiums for papers read before the Society during the past year) introduced the President for the present year, Mr. D. Butler Butler, Assoc.M.Inst.C.E.

The new President then delivered his Inaugural Address. Prefacing his remarks with an acknowledgment of the honour the members conferred upon him by his election, he briefly referred to the affairs of the Society, and expressed the satisfaction of himself and the Council generally that the membership for the past year had proved to be the highest on record. He also alluded to the fact that the present year marks the fiftieth anniversary of the foundation of the Society, which was established in 1854, and said he hoped it would prove a memorable one in its annals. He then passed to the main subject of his address, which dealt chiefly with portland cement and the various phases in which it affects the engineering profession. Dealing first with its manufacture, he briefly described the several processes now in vogue, and laid stress upon the necessity of the three main operations being efficiently carried out, in order to obtain good results. He observed that the manufacture of cement was not the mere navvying or lumping together of so many tons of chalk and clay, as many seemed to suppose, but a delicate chemical operation, involving great nicety in the proportioning of the calcareous and argillaceous ingredients, and their conversion from carbonate of lime and silicate of alumina into definite silicates and aluminates of lime. The new rotary kiln or system of calcination was briefly described. With regard to the testing of cement, the great need was uniformity in the methods of carrying out tests; and the President expressed the hope that the Standards Committee of the Engineering Institutions would be able to arrive at a workable system. Stress was also laid upon the desirability of some quicker way of arriving at the quality of cement, without having to wait the usual 7, 14, or 28 days necessary to allow the test pieces to set and harden. The President went on to remark that the uses and applications of cement were increasing day by day. The most important innovation of recent years had, he said, been the introduction of ferro-concrete, in which, by embedding suitably arranged steel rods and wires into the concrete, its resistance to tensile stresses was increased about tenfold, and thus rendered equal to its resistance to crushing stresses. One of the most important uses of this material was in the production of concrete piles, specimens of which the Society had the opportunity of inspecting during their visit to the Southampton Docks, in 1902, where these piles were being made and used with much success for ordinary dock work. The great advantage of such piles was their increasing strength with age and practical imperishability. The President went on to show that many of the causes of complaint against portland cement arose from a lack of knowledge of its properties—such, for instance, as the dissatisfaction frequently caused by concrete failing to set and harden sufficiently quickly during very cold weather. Experiments were quoted showing that, taking 60° Fahr. as normal, the setting was accelerated by 14 per cent. at 80°, and retarded by 114 per cent. at 40°. It was urged that if cement were used with a fair admixture of common sense, many of the causes of complaint frequently occurring would cease to exist.

At the close of the address, a hearty vote of thanks was accorded to the President.

JAGER PATENT GRIDS FOR PURIFIERS.

In the "JOURNAL" last week, the announcement was made that Messrs. Samuel Cutler and Sons had secured the control of the patents for the Jäger gas-purifier grids, &c., for Great Britain, Ireland, the Colonies, and some other countries. This intelligence, while interesting in itself as an evidence of the enterprise of the firm named, does not afford any enlightenment as to the nature of the system. That it must be of value, however, is apparent from the statement that within a year (the first, too, of its application) more than thirty installations were made on the Continent, comprising 100 purifiers. In the circumstances, readers will no doubt appreciate an explanation of what comprises the Jäger purification system

The invention has for its object the disposing of the purifying material in a manner that appears to be entirely novel, and the effects are stated to be a greatly increased efficiency and a corresponding augmentation of the purifying capacity of any purifier in which the grids and devices are fitted. Beyond these

FIG. 1.

FIG. 2.

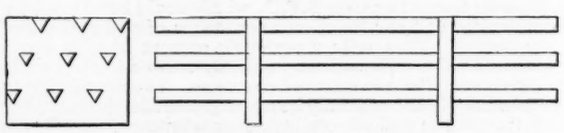


FIG. 3.

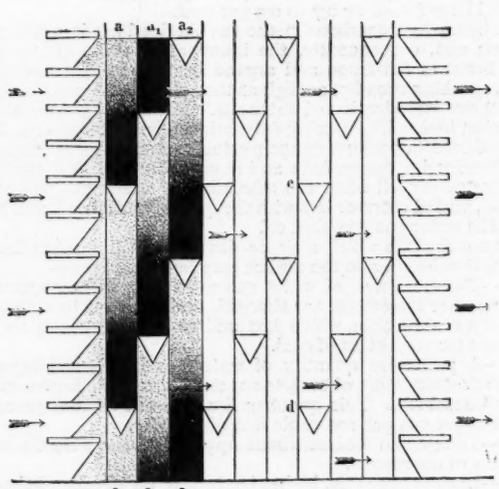


FIG. 4.

benefits, there is a considerable reduction of the pressure due to the passing of the gas through purifying material. The arrangement has furthermore the advantage that it can, at comparatively small cost, be applied to existing purifiers, and thus, in cases where the daily output has overtaken the purifying capacity, the expense of installing new purifiers can be saved.

The important distinction between Jäger's system and an ordinary purifier is that the gas, instead of travelling in a vertical direction, traverses the purifiers horizontally; this being made possible by an arrangement of channel grids extended across the purifier, which serve the purpose of directing the gases into the purifying material in the manner illustrated by the various accompanying diagrams. The direction in which the gas flows from the channel grids is clearly indicated in fig. 4. It passes horizontally right and left through the purifying material into the corresponding outlet channels, and thence into the outlet chamber.

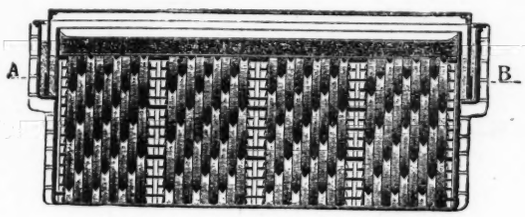


FIG. 5.

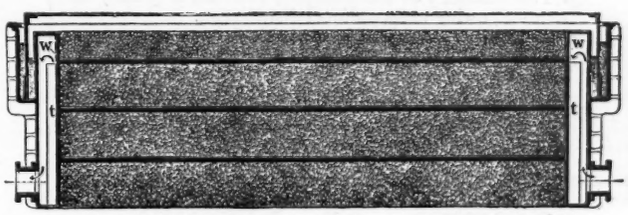


FIG. 7.

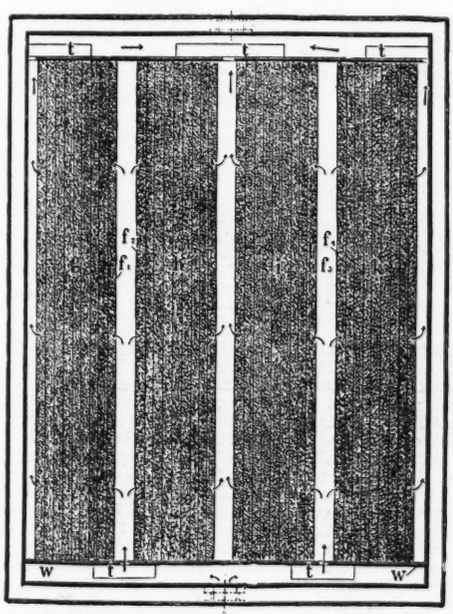


FIG. 6.

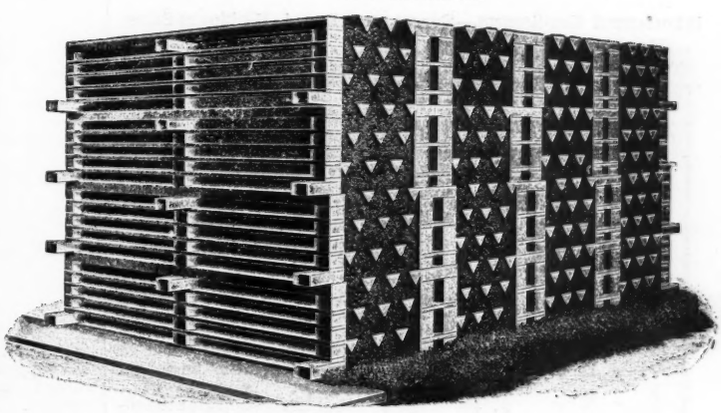


FIG. 8.

The manner in which the purifying material is supported is novel and all-important; the shape and disposition of the bars forming the grids being such that the material is quite evenly distributed, presenting uniform density throughout, and thus the gases in their horizontal passage are met in all parts with the same degree of resistance. For instance, referring to fig. 4, if the purifying material distributed over the grids is considered as cut into vertical sections A, A1, A2, each of equal width to the top surface of the triangular bars, it will be seen that no layer of material is thicker than the vertical interval between any two superimposed bars as at C and D on the diagram, and also that the disposition of the bars is such that the gas in passing horizontally from the inlet to the outlet channel encounters the same gradations of density at all positions—thus ensuring uniform and thorough exhaustion of the purifying material.

The following particulars are from a published description of purifiers fitted with the Jäger grids in use at the Municipal Gas-Works in the Gitschiner Strasse, Berlin:—

Each of the four purifiers has an area of 36·800 square metres, and is 1·644 metres high. If fitted with horizontal sieves, and with the standard number of four layers of purifying material, each 150 mm. thick, a single purifier would contain 22·080 cubic metres of purifying material and have a contact surface of 36·800 square metres. If, on the other hand, these purifiers are fitted with the new grids as now described, each will contain 34·960 cubic metres of purifying material, and have a contact surface of 67·200 square metres.

Tabulating the above figures, we have the following comparison, which needs no further comment:—

—	Horizontal Sieves.	Jäger Vertical Grids.	Increase Due to Jäger Grids.
Working contact surface	36·800 sq. met.	67·200 sq. met.	83 p.c. larger contact surface
,, ,, ,,	22·080 cub. ,,	34·960 cub. ,,	58 p.c. more purifying mass

The following results in regard to capacity and pressure are also instructive:—

The purifiers which had formerly been only sufficient for dealing with 36,000 cubic metres per diem were now called upon to deal with a daily production which at times amounted to 73,000 cubic metres. With the Jäger grids, the loss of pressure with the output at 73,000 cubic metres per diem amounted to 99 mm. for the four purifiers; whereas, with horizontal sieves, and an output of only 36,000 cubic metres, it had been 150 mm.

It is obvious from the experience at hand that no difficulties attend the charging and discharging of purifiers fitted with the grids, as the material distributes readily and uniformly. When putting the grids in position, the bottom layer is placed in the manner shown in figs. 5, 6, and 7; and upon the grids the purifying material is laid, and then swept over with a broom, so as to make the top of the mass even with the top of the grid. A second layer of grids is now laid in place, and fresh material added; a broom being again passed over to make it even. The same proceeding is repeated for each separate layer of grids—the last being covered with a layer of purifying material to a depth of from 6 to 9 inches. When removing the grids, it will be found that a considerable portion of the purifying material remains between the grid bars; and as this can be lifted out with the grids, it considerably assists the discharging of the purifier.

The reproduced photograph shows one of the purifiers at the Berlin Municipal Gas-Works with the cover removed, and the interior partly stacked with Jäger grids.

The following are among the advantages claimed for the Jäger system:—

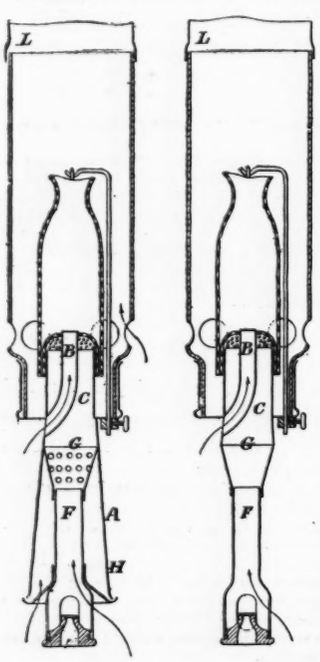
(1) The output of a purifier is doubled.
(2) The purifier can be charged with 30 to 50 per cent. more purifying material.
(3) The efficiency of the purifying material is greatly increased, owing to its uniform distribution.
(4) Pressure is considerably diminished.
(5) Existing purifiers can be readily fitted without alteration of pipes and valves.

The results indicate that new purifiers, designed with Jäger grids and accessories, need only have an area equal to about 50 per cent. of that required where ordinary grids are used.

REGISTER OF PATENTS.

Incandescent Gas-Burners.—Denayrouze, L., of Neuilly-sur-Seine, France. No. 5955; March 14, 1903.

This incandescence gas-burner (according to the pressure of the gas supply) is provided with one or more supplementary air-supplies. For this purpose, the bunsen burner is surmounted by a chamber—the lower part of the form of two truncated cones placed base to base. Through this chamber passes a tube, arranged to conduct air from outside the burner to the centre of the base of the mantle. In one form of burner the bunsen tube is surrounded by a tube preferably outwardly coned from the base, and extending to the lower part of the bunsen burner. The support of this tube has openings for the admission of air; and when it is used, the lower part of the chamber is perforated. The burner is surmounted by a chimney (which may have holes in its lower part), to create sufficient draught to draw in air through the admission openings.



Vertical sections are given of two different forms of this burner. In the first, the conical exterior tube A rests on a perforated support H, and surrounds the bunsen burner F—the tube extending upwards to the bottom of the chamber C. The latter is an inverted truncated cone G, with perforations.

When an extension L is placed on the chimney, the gas issuing from the burner-jet draws air into the tube F, and intermixture of gas and air occurs. The mixture having arrived at the top of the tube expands in the chamber C, where there is another influx of air through the base of the tube A and the holes. The mixture now ascends to issue beneath the mantle, where it receives a further addition of air through the centrally-arranged tube B.

The air entering through the holes at the lower part of the chimney causes the diverging flame to converge towards the centre of the mantle; and the flame (which is always richer in combustible gas in its interior than on its exterior) receives an internal supply of air through the tube B, so that combustion is complete.

In the second modification, there is no supply of air at the base of the chamber C; the sole secondary air supply being through the tube B.

Purifiers.—Elster, J., of Berlin. No. 14,970; July, 6, 1903.

Under patent No. 19,644 of 1902, a grating-like device for supporting purifying and filtering material for gases or liquids—especially lighting gas—was described, which, in order that the gases conducted through the material might always meet with the same average density of material at every stage, and, consequently, encounter the same average resistance, was constructed of a horizontal net-like arrangement of slabs or bars placed transversely to the flow of the gases; the horizontal projections of the bars forming a continuous plane. The object of the present invention is an improvement of the device; and particulars of the modified arrangement are given in an illustrated article appearing on p. 406.

Lighting and Extinguishing Gas from a Distance.—Weinmann, G., of Zurich, Switzerland. No. 22,481; Oct. 17, 1903.

Gas-igniters adapted to be operated from a distance by altering the pressure of the gas, so as to ignite and extinguish the flame, have the disadvantage (the patentee points out) that the pressure in the mains must be maintained uniform during the entire period of lighting; otherwise the cut-off mechanism of the burners moves with the fluctuations of pressure, so that undesirable interruptions occur. The present invention is said to remove these disadvantages, by causing the cut-off mechanism to remain in its open position, after being opened, until a brief increase of pressure intentionally produced in the pipe-system causes it to return to its closing position and put out the light.

Fig. 4.

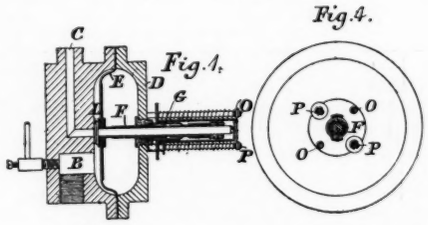


Fig. 1.

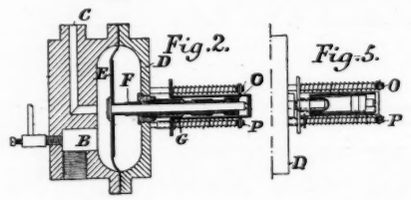
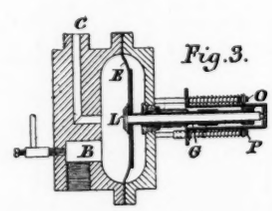


Fig. 2.

Fig. 5.

Fig. 3.



The igniter is furnished with two gas-ducts B and C. One side of the support of these ducts is concave, and provided with a convex cover D, by which the edge of a membrane E is pressed against the support. Fixedly connected to the membrane is a tube F, which carries, at approximately its centre, a small sleeve G, the outer diameter of which is flush with that of the tube F. The latter is guided in a bearing fixed to the cover and provided with two slots arranged opposite each other. In the tube a pointed rod carrying a valve L is moveable. The pointed end of the rod is recessed in a stirrup, the rotation of which is prevented by two pairs of rods O and P, which extend through its circular foot, and are fixed to the cover. Springs mounted on the rods, and abutting against screw-collars on M, bear against the foot, so as to press the stirrup against the end of the valve-rod; and other springs mounted on the rods bear against screw-collars on the latter and against flanged sleeves mounted on the rods P. These sleeves are moveable in apertures in the foot, and abut against the cover D when the igniter is at rest (fig. 1), so that the springs exert no pressure on the stirrup. Fixed to the cover D are two elastic catches, the free ends of which rest on the forward part of the tube F when the mechanism is in the position shown in fig. 1.

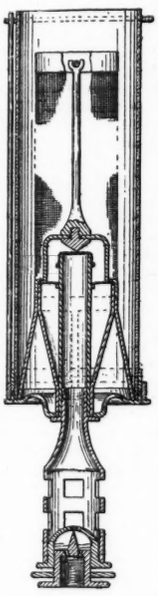
When the pressure in the mains is low (during the day time), the valve L abuts against its seat, as in fig. 1. To ignite a number of burners the pressure is temporarily increased to slightly above the normal working pressure. When this wave of pressure occurs, the membrane E and tube F are forced towards the right (fig. 2), so that the valve is lifted from its seat and gas flows from the pipe B to the duct C and the burner, where it is ignited by the flame of a bye-pass burner. During the forward movement of the tube F, the catches slide on its surface until they engage into the recessed part at the centre. The outward movement of the membrane and opening of the valve do not take place until the pressure is sufficient to overcome the pressure of the springs, so that the igniter can be regulated to act at any predetermined pressure.

When the increase of pressure has operated all the igniters on which it is intended to act, the pressure in the pipe-system is altered to the normal or (say) slightly reduced. This results in a rearward movement of the tube F under the action of the springs; but the catches which engage the recessed part of the tube prevent the complete return of the latter and the closing of the valve, so that fluctuations in the normal gas pressure do not affect the valve.

To extinguish the burners, an increase of pressure is again produced in the pipe-system; this increase being of such value that the pressure is greater than that used for igniting the burners. By this means, the membrane E is moved forward farther than before, so as to overcome the pressure of the springs and push the sleeve G underneath the catches, which, by this means, are lifted out of the recess in the tube F. When this increase of pressure has acted on all the igniters, the pressure in the pipe-system is reduced to the normal working pressure, so that the membrane E and the valve L move back under the action of the springs. During this return movement, the sleeve G is held fast until its right-hand end abuts against the tube F, whereupon the sleeve moves with the latter and the catches again rest on the forward part of the tube. The valve L and membrane can thereupon return to the position shown in fig. 1.

Gas-Burners.—Reinhardt, L. J., of Orange City, N.J., U.S.A. No. 27,279; Dec. 12, 1903.

As shown, this burner contains a needle governing-valve, and is provided at the centre of the top with a gas opening or passage adapted to receive the valve, while around the base of the needle there is a series of perforations, through which the gas flows. By turning the top, the opening is increased or diminished by the insertion or withdrawal of the tapering needle, and so the flow of gas to the mixing-chamber is varied. The mixing-chamber comprises a hollow or tubular piece provided at or near its base with screw-threads adapted to engage corresponding screw-threads formed on the outer periphery of the dome of the valve section. The upper end of the perforated mixing-chamber is tapered, and on it is telescopically fitted a tubular extension which reaches from the mixing-chamber above the point of ignition. To support this extension, the top of the mixing-chamber has an exterior annular flange, upon which is seated an upwardly flaring sleeve fitting at its bottom closely about the extension at its junction with the mixing-chamber. The upper end of the sleeve surrounds the extension at some distance below its extremity, and is closed by a cap providing a flat annular portion at the margin of its top, which has ignition openings. The centre portion of the cap or cover is raised or extended upward, to enclose the end of the extention-tube, and form around it a gas pre-heater above the point of ignition. In this way there is a space between it and the upper end of the extension; and at a point in line with the vertical passage through the extension the pre heater is provided with an interior spreader, consisting of an inverted conical metallic piece, the apex of which lies at or near the axial centre of the extension and nearly flush with the upper end.



The spreader is preferably a solid piece of metal, provided at its upper or base portion with a shank, which extends through a central perforation in the pre-heater, and is threaded to receive the lower end of a mantle rod or support; the lower end of the mantle sitting upon the cover outside the ignition-openings, and thus enclosing the pre-heater. Thus the mixed gases will be directed vertically upward around the outer vertical sides of the pre-heater, and be prevented from contracting at once toward the axial centre of the flame after issuing from the ignition-openings; and also the gas issuing from the annular series of openings, will, as it burns, be held in contact with the cylindrical sides of the mantle, so as to maintain it in a high state of incandescence from its base upward to or near the top.

Regulating the Air Supply to Atmospheric Burners for Incandescent Gas Lighting.—Bray, J. W., of Leeds, No. 27,643; Dec. 17, 1903.

This invention is particularly applicable to the burner described in patent No, 15,630 of 1903, where a certain amount of air is admitted at the base of the burner (as is also the case with the ordinary bunsen burner), which, however, is provided with means of regulating the quantity of air. In this improvement, the amount of air is regulated to suit the burner, and the regulator remains in the regulated position in spite of any vibration to which the burner is subjected in lighting or cleaning, instead of fixing the air-inlets in a certain position (say) by a screw.

The illustration represents an elevation of the outer casing of the air-chamber of the burner; an elevation of the inner casing of the air-chamber; a section through the outer and inner casings when placed together; and an elevation showing the outer and inner casings in position.

The air-chamber consists of outer and inner circular casings of metal, with air-holes corresponding in shape and in area in the outer and inner casings. The inner casing is attached to the gas-nipple; while the outer casing, and with it the burner, can be so moved round as to close the air-openings in the ordinary manner. There is in the inner circular casing a groove, preferably above the perforations, with a dent in the outer casing in a corresponding position to the groove. The inner casing is placed in the outer casing; and by reason of the elasticity in the inner and outer cases, the dent is pressed into the groove, so as to hold the inner case firmly in the position required without any other attachment.

Incandescent Mantles.—Maisch, G. H., of Baltimore, U.S.A. No. 24,815; Nov. 14, 1903.

With the object of increasing the durability of mantles and raising their candle power, the patentee proposes to produce upon, and within, the body of the mantle what he calls a "glaze-enamel." This is compounded of the following materials: Feldspar, 1·75; pure flint, 1·25; whiting, 0·60; china-clay, 0·75; carbonate of lead, 1·25. It may be employed in a number of different ways. For instance, the compound may be dissolved in water in an amount sufficient to give a milky appearance to the water. After filtration, through a fabric of fine silk lawn, the filtrate is combined with a "rare-metal" dipping solution for incandescent mantles consisting (say) of the following ingredients: Nitrate of thorium, 100; nitrate of cerium, 0·66; nitrate of magnesium, 5; nitrate of beryllium, 5; and nitrate of cobalt, 0·50. The quantity of the glaze-enamel to be added to the rare-metal solution is usually about one-fourth by weight.

APPLICATIONS FOR LETTERS PATENT.

2408.—Parkes, F., "Internal combustion engine." Feb. 1.
2451.—The British Thomson-Houston Company, Ltd., "Photometric Apparatus." A communication from the General Electric Company. Feb. 1.
2479.—Thurnauer, L., "Gas-chandeliers." Feb. 1.
2481.—Brooks, W. H., "Generation of gas." Feb. 1.
2495.—Recklinghausen, M. von, "Gas-lamps." Feb. 1.
2521.—Wilkinson, J. F., and Gregson, T., "Incandescent burners." Feb. 2.
2541.—Hegeler, H., and Heinz, N. L., "Glover towers." Feb. 2.
2546.—Capitaine, E., "Gas-motors." Feb. 2.
2547.—Capitaine, E., "Suction gas-producers." Feb. 2.
2564.—Holbrook, W. E., and Bibbero, M., "Anti-vibrators." Feb. 2.
2570.—Saltar, J., Jun., "Retort chargers." Feb. 2.
2615.—Spreadbury, R. J., "Incandescent burners." Feb. 2.
2651.—Morton, F., "Folding gas-cooking attachments for kitcheners." Feb. 3.
2654.—Hall, W., "Incandescent burner." Feb. 3.
2746.—Oram, A. L., "Internal combustion engines." Feb. 4.
2764.—Gruby, E., "Incandescent burners." Feb. 4.
2790.—Jordan, R. J., "Burning and cooking gas." Feb. 4.
2822.—Marks, G. C., "Connecting pipes to mains under pressure." A communication from A. & F. Capello. Feb. 4.
2860.—Dempster, R., "Purifier lutes." Feb. 5.
2861.—Beard, G. F. H., "Hydraulic mains." Feb. 5.
2878.—Jameson, J., "Gas-fires." Feb. 5.
3018.—Davis, G. E., "Manufacture of cyanides." Feb. 6.

An Anti-Vibrator Patent.—At the Manchester Assizes last week, Mr. Justice Bigham was engaged in hearing the action of *Crossley v. Coates*, in which the plaintiff (who was described as an incandescent lamp dealer of Burnley) claimed an injunction and damages for infringement of a patent by the defendant (a cycle dealer of the same town). The invention referred to was an anti-vibrating device for suspending incandescent gas-lamps in mills and weaving sheds, &c., in such a way that the coil spring, while securing the lamp to the ceiling, was out of the line of heat. Plaintiff said the arrangement had been very successful, and had done away with all risk of the mantles being destroyed by the vibration. The defence was that a man named Andrew Jackson had manufactured the springs previous to plaintiff obtaining a patent. They were said to have been used regularly in the district to suspend bird-cages as well as lamps; and the same principle governed the suspension of many bicycle lamps. Before the evidence for the defendant was completed, the Judge stopped the case. He did not believe, he said, that the device was good subject-matter for a patent at all. Jackson seemed to be the only man entitled to make money out of the arrangement; but he apparently was getting nothing. Judgment was given for the defendant, with costs.

Embezzlement by a Gas Collector.—Charles Dalton, for some time a collector in the employment of the Salford Corporation Gas Department, was last Tuesday charged at the Police Court with embezzling three small sums, amounting altogether to 16s. 8d. Mr. Greenhalgh, Assistant Town Clerk, said the prisoner's duty was to collect moneys placed in the automatic meters used by many gas consumers in the borough. The sums thus received should have been entered in a book, and the amounts paid into the bank twice a week. Though Dalton was only charged with embezzling these three small amounts, it had been found that he had failed to pay into the bank on Jan. 23 a sum of £23 odd which he had collected, and a further sum of £31 on Jan. 27. He absconded to Nottingham, and was arrested under warrant. Prisoner pleaded guilty; and Mr. Desquesnes, on his behalf, said this was another instance of the results which so often followed on betting and gambling. Dalton had lost money in betting; and in order to cover his losses, he had given way to the temptation to use the money which came into his possession. He was sentenced to three months' imprisonment.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF LORDS.

The following progress has been made with Bills:—

Bills presented and read the first time: Appleby Corporation Gas Bill, Barnard Castle Gas Bill, Barrow-in-Furness Corporation Bill, Belfast and North-East Ireland Electricity and Power Gas Bill, Chesterfield Gas and Water Board Bill, Derwent Valley Water Board Bill, Ebbw Vale Urban District Water Bill, Filey Improvement Bill, Gosport Water Bill, Harlow and Sawbridgeworth Gas Bill, Harrogate Water-Works Tramroad Bill, Huddersfield Corporation Act, 1902 (Amendment), Bill, Leeds Corporation (Water-Works) Railway Bill, Manchester Corporation (General Powers) Bill, Matlock and District Gas Bill, Minehead Urban District Council Water Bill, Newcastle and Gateshead Water Bill, New River Company Bill, Oakengates, Dawley, and District Joint Water Board Bill, Preston Corporation Water Bill, Shipley Urban District Council Bill, Ticehurst and District Water and Gas Bill, Tynemouth Gas Bill, Withnell Gas Bill, and York Town and Blackwater Gas Bill.

Bills read a second time: Appleby Corporation Gas Bill, Barrow-in-Furness Corporation Bill, Chesterfield Gas and Water Board Bill, Derwent Valley Water Board Bill, Ebbw Vale Urban District Water Bill, Filey Improvement Bill, Harrogate Water-Works Tramroad Bill, Huddersfield Corporation Act, 1902 (Amendment), Bill, Leeds Corporation Water-Works Railway Bill, Minehead Urban District Council Water Bill, Oakengates, Dawley, and District Joint Water Board Bill, Preston Corporation Water Bill, and Shipley Urban District Council Bill.

Petitions have been presented against the following Bills: Barrow-in-Furness Corporation Bill, Belfast and North-East Ireland Electricity and Power Gas Bill, Derwent Valley Water Board Bill, Ebbw Vale Urban District Water Bill, Gosport Water Bill, Harlow and Sawbridgeworth Gas Bill, and Manchester Corporation (General Powers) Bill.

HOUSE OF COMMONS.

The following progress has been made with Bills:—

Bills read a second time: Doncaster Corporation Bill, Hampton-in-Arden Gas Bill, Kirkby-in-Ashfield Urban District Gas Bill, Leeds Corporation (Consolidation) Bill, Littlestone-on-Sea and District Water Bill, Lytham Improvement Bill, Selby Urban District Council Bill, Skipton Water and Improvement Bill, Swindon Corporation Bill, and Thurles Urban District Council Water Bill.

Petitions have been presented against the following Bills: Amersham, Beaconsfield, and District Water Bill, Arlesey Gas Bill, Barnet District Gas and Water Bill, Bexhill Water and Gas Bill, Bishop's Stortford and District Gas Bill, Brixham Gas Bill, Brymbo Water Bill, Cheshire Electricity and Power Gas Bill, Chippenham Gas Bill, Colney Hatch Gas Bill, Croydon Gas Bill, Crystal Palace District Gas Bill, Doncaster Corporation Bill, Gaslight and Coke and other Gas Companies' Acts Amendment Bill, Hampton-in-Arden Gas Bill, Kirkby-in-Ashfield Urban District Gas Bill, Leeds Corporation (Consolidation) Bill, Littlestone-on-Sea and District Water Bill, Lytham Improvement Bill, North-Western Electricity and Power Gas Bill, Rickmansworth and Uxbridge Valley Water Bill, Rotherham Corporation Bill, Selby Urban District Council Bill, Sheppey Gas Bill, Skipton Water and Improvement Bill, Southend-on-Sea Gas Bill, South Shields Gas Bill, Sutton Gas Bill, Swindon Corporation Bill, Wellington (Somerset) Gas Bill.

At the sitting of the House on Monday last week, Mr. John Ellis asked the President of the Board of Trade whether he would lay upon the Table a return showing the names of companies or persons who have obtained Acts authorizing the supply of electric power to districts, with the names and areas of these districts, and the year in which the powers were obtained, and whether or not they have been exercised; and, in the former case, what is the state of the works constructed under these powers. Mr. Gerald Balfour replied that he had given instructions for the preparation of the return; but as the information asked for in the latter part of the question was not in the possession of the Board, it would be necessary to communicate with the various parties concerned before the return could be completed.

Opposition to the Crystal Palace District Gas Bill.—At their meeting last Tuesday, the London County Council decided, on the recommendation of the Parliamentary Committee, to oppose this Bill.

Gas v. Electricity for Lighting Public Libraries.—The Chief Librarian to the West Ham Corporation reported at Tuesday's meeting that the cost of the electric light at the Central Library during the past two years had been £253 11s. 3d.; whereas the cost of gas for the last two years that it was used was only £133 3s. 10d. The cost at the other libraries would, he said, show similar comparisons; and consequently on this item alone the burden on the fixed rate was nearly doubled.

The Manchester Corporation Gas Committee's Contract.—The Gas Committee of the Manchester Corporation had a special meeting on Monday last week, to consider the question of placing the contract for the erection of an installation of inclined retorts at the Gaythorn station, to which reference was made in the "JOURNAL" last week. It will doubtless be remembered that the Committee, on the advice of their Chief Engineer (Mr. J. G. Newbigging), recommended the acceptance of a tender from a firm outside the city; and the Council declined to do this, but referred the matter back. The Committee decided to direct that new specifications should be prepared, and fresh tenders advertised for.

LEGAL INTELLIGENCE.

SUPREME COURT OF JUDICATURE—COURT OF APPEAL.

Friday, Feb. 12.

(*Before the* MASTER OF THE ROLLS *and Lords Justices* ROMER *and* MATHEW.)

In re an Arbitration between the East London Water-Works Company and the Metropolitan Water Board.

This was a special case stated by the Arbitrators under the Metropolis Water Act, 1902, for the opinion of the Court as to whether or not the undertaking of the East London Water Company as transferred to the Board was subject to the payments to the Chamberlain of London's sinking fund, or whether it was free from them. The determination of this question also affected the Grand Junction and New River Companies.

Mr. BALFOUR BROWNE, K.C., Mr. C. A. CRIPPS, K.C., and Mr. D. C. BARTLEY appeared for the Company; Mr. FLETCHER MOULTON, K.C., Mr. G. M. FREEMAN, K.C., and Mr. HONORATUS LLOYD, K.C., represented the Water Board.

Mr. BALFOUR BROWNE, in opening the case, said the Arbitrators had decided that, according to the true construction of the East London Water Company's Acts of 1886, 1894, 1897, and 1900, and the Metropolis Water Act, 1902, the undertaking of the Company ought to be valued as subject to, and not as free from, the obligations to contribute to the Chamberlain's fund created by the four first-mentioned Acts; and they awarded that the sum to be paid by the Water Board for the undertaking, together with such allowances as were thought just for recoupment of any loss of interest pending reinvestment, as well as for the cost of reinvestment, was as follows: (*a*) If the Court of Appeal should hold that they were right in their decision on the point of law, the sum of £3,900,000; (*b*) if they were held to be wrong, then the sum was to be £4,300,000. The difference to the Company was really £400,000. After calling attention to the sections of the Act creating the sinking fund, which was to be applied by the Chamberlain of the City of London, as Trustee, for the purpose of purchasing and extinguishing the share capital of the Company, or for such other purposes as Parliament might from time to time determine, he said that in the year 1880 the Government proposed to enter into a bargain with the Water Companies; and in 1881 a Committee was appointed to consider whether or not these bargains were provident. The Committee reported that they were not; and consequently the purchase did not take place. Ever since that time purchase had been in the air; and when the Company in 1886 went to Parliament and asked leave to spend further money upon works, there was introduced into the Act of that year a clause which was intended to take away from them any benefit they might get under the new capital. The effect of the clause was this: If the Company only earned 4 per cent. on the whole of their stock, including the debentures, nothing whatever went to the Chamberlain; but if they earned 6 per cent., 2 per cent. was to go to him for the benefit of the public. From 1886 to 1894, the Chamberlain purchased stock and extinguished it by cancellation; but in the latter year it became obvious that by cancelling all stock so purchased the value of the undertaking to the remaining shareholders was being enhanced. Since then he had purchased shares and held them, receiving dividends upon them the same as the other shareholders. In the year 1902 (which was the one the accounts of which were taken as the basis of the calculation in assessing the amount of compensation), the amount available for dividend to the ordinary shareholders was £107,000; but £5750 had been previously deducted as the amount of dividend payable to the Chamberlain. His contention was that the actual income of the Company, of which so many years' purchase had to be given as the amount of compensation, was not £107,000, but £107,000 *plus* £5750.

Mr. CRIPPS followed on the same side.

Saturday, Feb. 13.

Mr. CRIPPS was further heard this morning; and their Lordships, without calling on respondents' Counsel, at once proceeded to deliver judgment.

The MASTER OF THE ROLLS said, notwithstanding the very interesting and able arguments addressed to the Court by Mr. Balfour Browne and Mr. Cripps, he had no doubt upon the question submitted to them. When one looked at the matter from a broad point of view, it was seen that when the Water Companies applied for statutory power to enlarge their undertaking, Parliament took advantage of the application to impose certain terms upon them; and one must assume that the charge was imposed with perfect justice—a *quid pro quo* no doubt being given for it. It was imposed in view of the probable future purchase of the undertakings by some public authority. This was the condition in which the Companies found themselves when Parliament intervened, and determined that they should be compulsorily sold to a body representing the public. The question now arose: What ought the compensation to be which was to be paid to the Companies who were under this burden? Ought the public, for whose benefit it had been imposed, to pay the Company on the footing that the benefit was one which they were in a position to sell? The persons who were buying were already in possession of the benefit of this charge. It was obviously fair to pay the seller for anything which he could give; but to pay for anything which was not his to sell did not rest in common sense. The scheme as carried out by the Act of Parliament was that compensation should be paid. This meant that an equivalent should be given for that which was parted with by the vendor. The Act provided that when the Water Board purchased, they were not to take the property subject to the charge which had been imposed by the

Legislature. The person who stepped in as representing the public was the buyer; and this person was not to continue under the obligation. The fact that the purchaser got the undertaking free from the burden was no argument for paying anything to the person from whom he bought the right. Then an argument had been addressed to the Court on the meaning of the word "undertaking." It was said that the purchaser acquired subject to the burden thereby transferred; and it was pointed out that this particular burden was not transferred, and that therefore something ought to be paid for the value of the undertaking in consequence of the charge not being imposed. But when one realized what the intention of the Legislature was, it was seen that it was intended that the Companies should only be paid for that which they parted with; and there was nothing in the exception which suggested anything to the contrary. In his opinion, the appeal failed, and must be dismissed.

Lord Justice ROMER said he was of the same opinion. He agreed with the Master of the Rolls in thinking that the case was governed by very simple considerations. The outgoing imposed by Parliament for the purpose of creating the Chamberlain's fund was clearly one which could not be better described than it had been by Sir Edward Fry, as being "an outgoing imposed for the benefit of the public." It was not imposed as a temporary measure. Parliament undoubtedly reserved to itself a power of dealing with the purposes for which the outgoing, when accumulated as a fund, should be applied. The Act provided that the fund so created should be applied by the Chamberlain of the City of London, as Trustee, for the purpose of purchasing and extinguishing the shares of the Company, or for such other purposes as Parliament might from time to time determine. That was to say, having imposed the term, Parliament reserved the right of applying the outgoing. The purposes indicated showed that the case must be treated as one where the outgoing was imposed for the benefit of the public, and not in any wise for the benefit of the Water Company. It was suggested that the Company might be said to have some interest in the outgoing, because, inasmach as it would be applied to purchase their stock or shares, such a purpose would, or might, have increased the value of such stocks or shares held in the Company by the ordinary shareholders. This, to his mind, was an impossible contention. In the first place, it was not clear at all that the application of the outgoing for the purpose of purchasing stocks or shares would have had any appreciable effect in increasing the value of those of the ordinary shareholders; and, in the second place, if it could be said that it had any appreciable effect whatever, it was too remote to enable the Court to say that it gave any real or substantial interest, on behalf of the ordinary shareholders, either in the outgoing, or in the fund created by it. Lastly, he might say he was perfectly certain—speaking for himself, having regard to the wording of the Acts of Parliament—that the Legislature had no object in treating this outgoing as a benefit to the Water Companies. Likewise, when they had to deal with the stocks and shares which had been bought from time to time by the outgoing so created, it was clear that these stocks or shares were held for the benefit of the public, and that the Water Company, regarded as a selling Company, had no interest in it. This being the position of affairs when the Act of 1902 was passed, what was done by that Act? However careful and detailed an investigation might be made into its provisions, and whatever ingenious argument might be based on the different sections, he thought it would be found, in construing them, that one would have to come back to the simple object of the Legislature as appearing from the Act as a whole. The Act had two objects. In the first place, it was to make the Water Company, as a selling body, sell its property to the Water Board; and, in the second place, the Legislature then, for the benefit of the Board, and only for its benefit, gave up the benefit that had accrued to the public by reason of the imposition of the outgoing, and the creation of the fund thereby formed for the benefit of the Board. This being so, what had to be done with regard to compensation to be paid to the Water Company? It was clear, to his mind, after full consideration of the Act, that what had to be awarded to the Company was, in the true sense, compensation for what they had to sell; and what they had to sell was the property belonging to them (speaking shortly), subject to the outgoing which had been created by the prior Acts of Parliament—the fund created for the Chamberlain of London. This being the case, it appeared to him to be impossible, on the Act of Parliament, to hold that it was the intention of the Legislature to compensate the Company for anything more than they had a right to sell; and it was impossible to hold that it was also intended to benefit the Company by extinguishing for their advantage, and not that of the Water Board, the permanent outgoing created by the Legislature. On these short grounds, he was of opinion that the decision of the Arbitrators was perfectly correct, and that the Appeal failed.

Lord Justice MATHEW gave judgment to the same effect.

Mr. MOULTON asked that the appeal should be dismissed, with costs.

Mr. BALFOUR BROWNE suggested that, as the appeal was incidental to the arbitration, the costs should be borne by the Board.

The MASTER OF THE ROLLS thought that the appeal was a luxury added on to the arbitration, and the costs must therefore be borne by the Company.

On the application of Mr. BALFOUR BROWNE, their Lordships granted a week's delay for the Company to consider whether they would carry the case to the House of Lords.

SUPREME COURT OF JUDICATURE—COURT OF APPEAL.

Wednesday, Feb. 10.

(*Before the* MASTER OF THE ROLLS *and Lords Justices* ROMER *and* MATHEW.)

Llandrindod Wells Water Company v. Hawksley and Others.

This was an appeal by the defendants against the decision of Mr. Justice Ridley, in April last year, by which he held that the plaintiffs were entitled to recover £102 7s. 6d. from the defendants under the following circumstances: The Urban District Council of Llandrindod Wells obtained an Act of Parliament for the purchase of the Water Company's undertaking—the price to be settled by agreement, or, failing that, by arbitration under the Lands Clauses Act. The plaintiffs appointed Mr. Hawksley as their Arbitrator; while the Council chose Mr. Mansergh; and these two gentlemen selected as Umpire Sir George Bruce, who sat with them to hear the evidence. The Arbitrators differing considerably in their figures, it fell to the Umpire to decide; but before doing so he went down to view the locality. When the award was ready, the usual letter was written to both parties informing them of the fact, and stating that the fees amounted to £476 12s. The award was at once taken up by the plaintiffs; but the Council, who had to pay the expenses of the arbitration, required the costs to be taxed, and for this purpose asked for particulars of the fees. The Arbitrators and Umpire declined to furnish any particulars beyond stating the amount due to each. The Taxing Master, however, ascertained from the parties the time occupied in the proceedings, and disallowed £119 5s. as between the Council and the plaintiffs; and this sum the latter sought to recover from the professional gentlemen to whom it was paid. At the trial before Mr. Justice Ridley, the only evidence adduced on the part of the plaintiffs was the certificate of the Taxing Master; but the defendants all gave evidence—in which they were supported by the late Sir F. Bramwell and other witnesses—that the fees were only fair and usual. They, however, gave particulars as to the amount of time occupied in the arbitration; and on these facts the learned Judge supported the decision of the Taxing Master, except that he allowed 25 guineas, instead of pounds, per day—making the sum disallowed £102 7s. 6d. instead of £119 5s. The deduction was, in effect, in respect of the time occupied, and not the rate per day.

Mr. LAWSON WALTON, K.C, and Mr. BRUCE WILLIAMSON appeared for the appellants; Mr. C. A. RUSSELL, K.C., and Mr. HERBERT SMITH represented the respondents.

Mr. LAWSON WALTON submitted, in the first place, that the plaintiffs could not recover, as they were volunteers; the duty of taking up the award being on the Local Authority, who could have been compelled to do so by *mandamus* if they had refused or neglected. In the second place, he contended that the only possible footing on which the plaintiffs could recover was that the charges in question were extortionate, which was clearly negatived by the evidence. Counsel's argument was comparatively brief, as it was evident from the outset that the opinion of the Bench was in his favour.

Mr. RUSSELL and Mr. HERBERT SMITH argued, at considerable length, that, on the authority of decided cases, the fees charged by arbitrators were subject to taxation or revision; that where they had been paid to take up an award, an action would lie to recover the excess; and that in this case the learned Judge below, acting as a Jury, had decided what was a reasonable amount, and had given judgment for the difference. They contended that it was a question of fact, on which his judgment would not be interfered with if there were any evidence to support it, which it was submitted there was in this case. No one disputed the fact that 25 guineas a day was the proper allowance, which was what the defendants alleged and Sir Frederick Bramwell and the other witnesses confirmed. The only question was as to the number of days to be allowed.

The MASTER OF THE ROLLS, in giving judgment, said the claim of the plaintiffs could only succeed if the charges made were extortionate, which was hardly alleged. There was, in fact, no evidence to support the plaintiffs' claim, the Taxing Master's certificate being made between different parties and for a different purpose. The appeal must therefore be allowed, with costs.

Lords Justices ROMER and MATHEW also gave judgment to the same effect; the latter saying he thought the defendants were quite right in refusing to acknowledge the authority of the Taxing Master in the matter, and declining to furnish him with particulars of their charges.

MIDDLESEX QUARTER SESSIONS.

Guildhall, Westminster—Saturday, Feb. 6.

(*Before Sir* RALPH LITTLER, K.C.B., K.C., *Chairman.*)

Rating of the East London Water Company's Reservoirs.

To-day two appeals by the East London Water-Works Company against the assessment of their new reservoirs in the parishes of Edmonton and Tottenham, were before the Court.

Mr. CRIPPS, K.C., and Mr. BARTLEY appeared for the appellants; Mr. A. MACMORRAN, K.C., Mr. C. GLEN, and Mr. W. RYDE represented the Assessment Committee of the Edmonton Guardians.

Mr. CRIPPS, in opening the case, said certain reservoirs, known as the Banbury and Lockwood reservoirs, which had been constructed, had not yet been taken over by the Council, as they had not been completed; and the appellants' main point was that they were still in the occupation of the Contractors, and therefore ought not to be rated. When the rate was made, the Contractors had about 80 men at work upon the reservoirs, which were to be made water-tight. To test their soundness, they had to be filled with water; and this was in them. It was not for the use of consumers, but only for testing purposes. In June last, there was a pleasant gathering, presided over by the Chairman of the Company (Colonel Lockwood, M.P.), to congratulate the Contractors upon their work; but he did not see that there was any connection between this and the completion of the reservoirs. The Overseers rated one at £12,000 and the other at £1500; and in August, 1903, the supplemental valuation list was approved. The appellants objected that they were not in occupation, beneficial or otherwise; and if they should be rated at all, the amount was a great deal too high.

Mr. *W. B. Bryan*, the Company's Chief Engineer, said the works were being constructed by Messrs. Pearson, under an Act obtained in 1897; and he had to be satisfied before taking them over. He had not yet expressed his satisfaction. When the rate was made, in June last, about 80 of Messrs. Pearson's men were at work. The reservoirs had

not been used by the Company, though they had been filled with water to test them. They were puddle-banked reservoirs; and from time to time they subsided. They had already been strengthened, and would not be taken over until April next.

In cross-examination, witness said the reservoirs had been full since June. They were only for storage purposes. Had there been a drought, they would have had to get the permission of the Contractors before the water could have been used. If they could have used this water, they would not have had to buy it from other Companies. The water belonged to the Company, and was taken from the River Lea under their powers.

By the COURT: He should assume that the Contractors could have emptied the reservoirs without the Company's consent; but there was no clause in the contract with reference to it.

In further cross-examination, witness said the Company would not have had to pay the Contractors for the water, but some arrangement would have been required as to the time of completion. The intakes could have been used in June, but they were not finished. The engine-house and the machinery were not ready until December; but one engine was workable in June. The contract stated that the work should be completed in January, 1902; but the time was extended. This was not done in writing. The formal opening ceremony took place in June; but the reservoirs were not then quite full. Colonel Lockwood, the Chairman of the Company, said then that the work had been completed to the satisfaction of the Company, and that there was no reason to find any fault with it. The function of the reservoirs was to act as a "stand-by." Their capacity was 1200 million gallons.

Re-examined: The regular staff of the Company had not taken over the works, though there was a special staff to superintend the work. The reservoirs were still being tested; but no leakage had been found so far.

Mr. *Sharratt* said he represented Messrs. Pearson at the works. They were still under the control of the Contractors, and had not been handed over. At the time the rate was made, the work had really not been completed. He wished the Company had taken over the work in June, to relieve him of responsibility.

In cross-examination, witness said the reservoirs had been kept full. He could not say what the cost of pumping was. The men had been doing all kinds of work at the reservoirs.

Mr. MACMORRAN said his contention was that the reservoirs were in the possession of the Company last June. It was not an uncommon occurrence for the owner to take possession before completion. Since June the reservoirs had been substantially full, and they were only constructed for storage purposes. Could it be contended that, had more water been required than the Company had in the other reservoirs, they would not have used the water in these? It was idle to say they were not in actual occupation. He did not know that he need call attention to any case, but there was that of *East London Railway Company v. Whitechurch* in the House of Lords. In this case, which was a decision on section 133 of the Lands Clauses Act in question, it was held that, as soon as there was a beneficial occupation, the works should be assessed. His point was that it was not necessary that the whole work should be completed before being assessed. As soon as occupation took place, the occupier must be rated. If his friend was right, no rates would be payable until the Contractors had sown the last seed of grass. It was said the reservoirs were to be used as a "stand-by." They were as much a "stand-by" now as ever they would be. Under the specification, the Company might be in occupation; but, according to them, until the last bit of grass had been trimmed off, they could not be rated. If this was so, the completion might be delayed indefinitely. The matter was fought out at great length in the Court below, and was decided on this very point; and it was a judicial decision. There was again the Birmingham Canal case, which supported his contention.

Mr. CRIPPS, in reply, said he should have cited the East London case in his favour, had he thought it necessary to rely upon any decisions of other Courts.

The CHAIRMAN said the Justices found, as a fact, that the reservoirs were in the occupation of the Company, and the appeal would therefore be dismissed, with costs.

Mr. CRIPPS said then there was the question of the amount.

Mr. MACMORRAN thought this could not now be gone into, as the objection was not before the Committee.

Mr. CRIPPS argued that the notice was sufficient, and that the matter had been raised before the Committee.

Mr. MACMORRAN said the amount had not been considered by the Committee; and he suggested that the question of figures should be dealt with by the valuers.

Mr. CRIPPS said the Company would not ask for costs if the Chairman's view was taken.

The CHAIRMAN said all they found at present was that, for the purposes of the rate, the works were complete. The case would therefore stand adjourned, to see if any decision could be come to as to figures. The respondents would have their costs. So far as the rating was concerned, the Committee succeeded.

The Gaslight and Coke Company Fined.

At the North London Police Court on Friday, the Gaslight and Coke Company were summoned before Mr. Fordham for supplying, on Dec. 7, 1902, at the testing-station in the Hornsey Road, gas of lower illuminating power than 16 candles, whereby they had become liable to the forfeiture prescribed by the statute. Mr. Godfrey, who represented the London County Council, explained that the light was 15½-candle power, and for being half-a-candle below the standard the forfeiture was 40s.; while for a whole candle it would be £20. These proceedings would have been taken before; but the Company questioned the right of the Council to test the gas on Sundays. This test was made on a Sunday; and the result was that the matter had to be decided in the High Court. The decision was in favour of the Council; and Mr. H. Rayner, the Company's Secretary, now appeared to pay the forfeiture, as the case would not be contested. Mr. Fordham made the formal order on the Company to pay 40s., with 23s. costs.

MISCELLANEOUS NEWS.

THE INQUIRY INTO THE TESTING OF GAS AND OTHER MATTERS IN LONDON.

From inquiries made at the Board of Trade, we learn that the Committee appointed to investigate and report as to various matters affecting the London Gas Supply met for the first time on Monday last week. They will resume the reception of evidence next Monday. The only witness so far has been Mr. Vernon Harcourt, one of the Gas Referees. At each sitting, the Committee will arrange for the succeeding one, in order to meet the general convenience of the members. The proceedings are not public.

GAS V. ELECTRICITY FOR SIDE STREETS.

The Fulham Borough Council have at present under consideration the question of the lighting of the side streets of their district. With the view of assisting them in coming to a decision as to the illuminant to be employed, the Borough Electrical Engineer (Mr. A. J. Fuller) has prepared a report on the subject which was issued last Wednesday.

Mr. Fuller states that in drawing up his report he took considerable trouble to ascertain the exact cost of ordinary gas lighting, using flat-flame burners, incandescent gas, incandescent electric lighting, and electric Nernst lamp lighting, so that the Lighting Committee might judge of the respective merits of each system. Taking the year ending March 31, 1903, he found that the total amount paid to the Gas Company for street lighting was £5058, which covered the cost of supply, attendance, and cleaning for an average of about 1650 lamps. The average cost per lamp, including all charges, amounts to £3 12s. This would be for an ordinary 5-feet burner. The Gas Company suggested that the Borough Council should enter into an agreement for incandescent gas lighting, under which the Company would supply and fix entirely new lanterns to all the existing posts, and furnish these lanterns with the necessary cocks, brackets, and fittings for mantles. They also undertook to light, extinguish, and provide all the necessary attendance as at present, and paint the columns and ironwork with two coats of paint once a year. To provide against the capital cost for this work, they offered to lend the Council a sum of £3360, spread over twenty quarterly payments of £168 each, after which the lamps, &c., would be the property of the Corporation. The Company did not propose to charge any interest on the amount. Under this arrangement, says Mr. Fuller, using the new type of gas-lamp, the annual charge for 1600 lamps would be £5520, of which £4848 would be for gas, &c., and £672 for the repayment of the loan. The Company also proposed to fix their new type of lantern, fitted with a No. 4 Welsbach or other improved incandescent gas-burner; and they guaranteed that the consumption would not be more than 4·25 cubic feet of gas per hour. This, however, was not of much importance to the Council, as the charge for gas supplied would be at a fixed rate per burner per annum. The charge per post fitted with one mantle under the new arrangement would be as follows: For gas £2 0s. 6d. per annum, *plus* 7s. 6d. for repairs, 4s. for mantles (at 6d. each), 2s. for rods, and 15s. for attendance—total per lamp, £3 9s. The lighting power per lamp is stated to be about 80 candles. Mr. Fuller goes on to say that, up to the present, no attempt has been made in Fulham to introduce electric lighting for the side streets, and so use some of the energy generated at the Council's works. He points out that of late years incandescent electric lighting has received considerable attention from makers of incandescent electric lamps, with the result that they are now able to turn out lamps which have very high efficiency, combined with long life. He believes that if the present posts were converted the result would give great satisfaction. The cost would be: For connection from the main cable to the switchboard at the top of the post, £1, including making good; for the necessary fuse and switch-box, altering lamp, &c., 15s.—total per post, £1 15s. If a special bracket were used, the total per post would be increased to £2 10s. The cost of renewing these per annum, taking current at 1½d. per unit for a 32-candle lamp, would be £2 6s. 10d.; renewals, 3s. 6d.; repairs and maintenance, 5s.; attendance, 15s.—total, £3 10s. 4d. per post. Mr. Fuller goes on to say that the Nernst lamp is of a different type from the ordinary incandescent lamp, inasmuch as its efficiency is extremely high, taking only 1·5 watts per candle power per hour, against the 3 to 4 watts per candle power per hour of an ordinary electric lamp. If this system were adopted, it would be possible to give a steady light continuously, equal to about 80 candle power, at a very low cost. As regards the cost of renewing, assuming the rate to be 1½d. per unit, one Nernst lamp of half an ampere capacity, giving from 70 to 80 candle power, would use 393 units per annum. Allowing for renewals 16s. 3d., and for attendance 15s., it works out at £4 0s. 4d. The total cost for fixing would be £2 15s. As the cables do not as yet extend into every street, Mr. Fuller finds that at present they could only convert 250 of the present lamp-posts for electric lighting.

The annual cost under each system for the 250 lamps works out as follows: Gas as at present, £754 3s. 4d.; incandescent gas, £862 10s. (capital outlay £555); incandescent electric light, £879 3s. 4d. (capital outlay £437 10s.); and electric Nernst, £1004 3s. 4d. (capital outlay £687). In comparing the above figures, Mr. Fuller wishes it to be borne in mind that under the Gas Company's suggested arrangement only 4s. for mantles at 6d. each is included, or eight mantles per annum. He thinks this figure is an under-estimate, and advises the Council, should they decide to go in for incandescent gas lighting, to get the Company to take all risks as to mantles.

SOUTH METROPOLITAN GAS COMPANY.

The Ordinary Half-Yearly General Meeting of this Company was held last Wednesday, at the Cannon Street Hotel, E.C.—Sir GEORGE LIVESEY in the chair.

The SECRETARY (Mr. Frank Bush) read the advertisement convening the meeting and the minutes of the last ordinary general meeting; the seal of the Company was affixed to the Register of Proprietors; and the report and statement of accounts, already given in the "JOURNAL," were taken as read.

The CHAIRMAN: Ladies and Gentlemen,—It is my duty to move: "That the report and accounts now presented be received and adopted, and the report entered on the minutes." Before dealing with general matters, it is necessary perhaps to refer to one or two items in the accounts. In each case the accounts speak for themselves. Speaking generally and broadly, they are very satisfactory; but there are one or two items to which I think attention may be drawn. One is the question of the parochial rates we have to pay. The rates are continually going up. During the half year, £38,000 was paid—that is to say, equivalent to £76,000 in the year—for parochial rates. The remark I have to make about it is that I think it is a great anomaly—a very great hardship upon public companies that they should be rated in this way. I am not talking about the amount of the rates—they are continually going up—but the largest ratepayers have no voice whatever in the spending of them, though it is a cardinal principle, I believe, of the British Constitution that there shall be no taxation without representation. Now, here we have it that the great ratepayers and the largest ratepayers are the joint-stock companies. The railway companies, the water companies, the gas companies, and the electric light companies—all public companies of this description—have to pay rates, and have not even a vote; whereas a man living in one room, and paying 5s. a week rent, has a vote for the election of borough councillors. We, the great ratepayers, have no vote whatever; and I think we might take a leaf out of the book of the passive resisters in this matter. If they have a case, surely we have a very much stronger one; and one would rather like to see what would happen supposing we refused to pay the rates. What would they do? Distrain? Well, I should like to see them distrain—take a gasholder away for instance, or something of the sort, which would at any rate bring the matter to a point. The next item in the accounts to which I would refer is the sum of £16,000 "to co-partnership." Now, this is a matter I think you all know about. It is a large figure which has been growing year by year; and when the last reduction of price was announced, one friend—who is a representative of the workmen—said: "What will the shareholders say about this £30,000 a year that is paid away on the profit-sharing, or, as we now call it, co-partnership system." "Well," I said, "you need be in no fear about the shareholders on that point. So long as they can be satisfied that the money is earned by good work, they will cheerfully assent to it being appropriated in this way. I may say further that, so long as the shareholders can be satisfied that the money is rightly and well used by the employees in enabling them to lift themselves from the position of being propertyless to that of property owners, so long I think the shareholders will say "go on." The other matter I wish to mention in connection with the accounts is a most important one—the reduction of price. The Directors have reduced the price of gas 2d. per 1000 cubic feet from Christmas last. We do not want to make comparisons; but the Chairman of the Gaslight and Coke Company said last week that they had made a greater reduction than either of the other two Companies; but he did not say that both the other Companies had reduced their price eighteen months before the Chartered reduced theirs at all, which makes rather a difference to his statement. Well, the policy of this Company, and I may say of our neighbours just across the river—the Commercial—is to reduce the price of gas whenever practicable, and as much as possible. We have therefore reduced it 2d. We have a considerable balance undivided—£55,000—to carry forward; and we think that we may safely make a reduction in the hope that, with the increase of business, and with various economies, if we do not make both ends quite meet this year we shall certainly do so next, if no unforeseen circumstances arise. What will be the effect on the shareholders of this 2d. reduction? You will now receive the full dividend to which you are entitled under the sliding-scale—£5 6s. 8d. per cent. Every penny reduction entitles us to divide an additional 2s. 8d. per cent., and 2s. 8d. added to £5 6s. 8d. would make £5 9s. 4d. We cannot, however, divide fractions like that; but seeing that the reduction is 2d., we may increase the dividend by 5s. 4d., which would bring it up to £5 12s. Then we do not propose to divide the odd 2s.; but we have every reason to hope that the next dividend will be at the rate of 5½ per cent.—as near as possible to the full amount we are entitled to pay. Now, ladies and gentlemen, I deal with general matters. The report makes a statement as to the position of the Gas Companies; and the remarks I have to make now will bear on that subject. Prior to the year 1860—to 1853 on the south of the Thames—it may be said that there was almost universal competition in the sale of gas. There were competing Companies in all the districts of London. In some there were as many as five Companies competing for the supply. But in the late fifties, arrangements were made whereby London was districted; and in 1860, Parliament sanctioned this, being satisfied that the competition of the various Companies had not resulted in the lowering of the price of gas, because there were so many capitals to provide interest upon, and where one would suffice two were in existence. But there was one fact about those days of competition. There were no restrictions imposed upon the Companies. They were allowed to make and to sell just such gas as they pleased; in fact, prior to 1850, I think there was no limitation as to illuminating power. This was first introduced, I believe, by the Great Central Gas Company about the year 1850. However, there were no conditions. We were to supply the gas that suited our customers, and the protection to the customers was found in the competition between the Companies. When Parliament decreed that competition should cease, it was thought necessary to introduce various restrictions. I am old enough to remember the days before these restrictions, and I state positively and clearly that the public have not been benefited one iota by all those which Parliament has imposed. Still, I do not blame Parliament in those days for imposing them. It was felt that, competition being abolished, the supply of gas would be an absolute monopoly, and the Companies could do what they pleased; and, therefore, Parliament thought it necessary to impose certain restrictions for the protection of the public. As we say in our report: "At that time Parliament thought it necessary, for the protection of the public, who, having no alternative, could not then protect themselves, to impose a number of restrictions, which, whatever use they may have been, have certainly kept up the price of gas." I think I am not far wrong in saying that gas engineers would be able to prove very easily that these restrictions have yearly cost the consumers of London not less than a quarter of a million of money. In those days, gas was used almost exclusively for lighting. Gas-stoves for cooking had been introduced. In 1850, my father had one in his house. But they were not at all general; and I do not suppose that one per cent. of the gas used in the sixties was employed for any other purpose than lighting by luminous gas. That is to say, the companies had an absolute monopoly—and, indeed, a double monopoly, for not only was there no competition between the companies, but there was no competing artificial light. But what is the case now? Mineral oil was introduced in the seventies, and electricity came later on for lighting purposes; and consumers had a choice of these alternatives. Working people very largely, and others too—it was not at all confined to the working people—adopted the use of mineral oil, which gave a very cheap and beautiful light; and this was really the most serious competitor the gas companies had up to the time of the introduction of electricity. In fact, I am not sure it is not the most serious competitor they ever had, because of its convenience and cheapness. Then came the electric light; and now consumers can please themselves as to what light they choose to use. They have gas, they have electricity, and they have mineral oil. If the gas companies do not supply them with gas that satisfies them or pleases them, they can leave them without any trouble whatever. Then another change has taken place. The use of gas for heating purposes has enormously increased, so that I believe it would be very easy to prove that not less than half of all the gas consumed is used for purposes other than lighting. Another point is that the gas used for heating purposes need not be luminous—in fact, in all these stoves and fires, and other things, luminosity is not wanted. The gas is burnt with an admixture of air in the bunsen burner generally; and for lighting, there is the wonderful incandescent mantle. A non-luminous gas can be used more effectively than luminous gas for lighting purposes. Well, what does London want? I have had an interview to-day with a gentleman connected with the Smoke Abatement Society; and I had a gentleman call upon me a fortnight ago also connected with the Society. I remember years ago the late Sir William Siemens said that the *desideratum* for London was a supply of fuel gas; and his idea was that there should be an independent supply of this gas from independent mains to anybody who wanted it. Well, as to the necessity for fuel gas there is no question whatever; but the impracticability of it was a bar to its introduction. It is not practicable to put down an additional set of mains in a place like London for the supply of fuel gas. But now things are different. Now a non-luminous gas is all that is wanted. The Gas Companies in their existing mains can supply fuel gas that will answer both the purposes of lighting and heating; and all that we ask is that Parliament should give us freedom to do the best we can for the consumers. Now here I would like to say that the difficulty is with the local authorities. I am speaking more particularly of the London County Council. Whenever a Gas Company go to Parliament for additional powers—we are not going to Parliament this session—they are always opposed most bitterly by the Local Authorities, who seem to have the impression that Gas Companies are the natural enemies of the consumers. Now, the sliding-scale has made a total difference there. It has made the consumers and the Companies partners; and it is to our interest to do the best we can for the consumer, for only by that means can we secure an increase of dividend. The sliding-scale, therefore, has placed us in the position of partnership. Now, I should like to quote one or two things that were said by the London County Council a little while ago. There was a question about testing gas on Sundays. This had never been done from the first; but the County Council got the idea that it was necessary to test the gas of the London Companies on Sundays, and why? One or two members were frank enough to state their reasons in a debate in the Council which was published in "The Times." One councillor said if the Gas Companies knew that the gas was not tested on Sundays—and it had not been so tested for thirty or forty years—"they would make Sunday a Royal day for cheating." Another gentleman, who was Chairman of the Public Control Committee, which has to do with these matters, said the Council wanted to test the gas on Sundays so as "to prevent the public being poisoned on that day." Well, if the Companies were cheating and poisoning the public, they would not use our gas; that would be their remedy. But I should like to put to you that this is a deliberate charge of dishonesty. These men said this in the Council; but the Chairman did not call them to order (as I think he ought to have done when a deliberate charge of that sort was made), but it was allowed to pass. I am bound to say I am afraid that is the opinion held by the majority of the Council. I will not say hard things about them as to why they have this opinion, why they judge us in this way; but I should like to say this to them—that we shall never have satisfactory relations with them until they treat us as honest men, as we have a right to be treated. I believe it is the right of the meanest criminal to be regarded as honest until he is found to be guilty. Now, a word about that matter of honesty. Officials of public Companies have no temptation to be dishonest. I can understand a man in some positions to whom it might be an inducement to supply an adulterated article—which cost so much less—at the full price, in order to put money in his pocket; but there is absolutely no

inducement to the officials of a gas company to supply an inferior article. They get no benefit from it; and, moreover, supposing the Directors encouraged anything of the kind, what could we expect? What could we expect if we encouraged dishonesty in our officers? Could we be surprised if they cheated us, because the readiest means would be to cheat the Company, not to cheat the public? Well, then, there is something higher than that. The men on this Board and the officers of the Company claim to be honest men. We claim to have reputations to lose, and we claim that in our dealings with the public we endeavour to be honest and fair (hear, hear); and anything to the contrary has never been proved. What I have to say is that we would prefer to be judged in this matter by those people who know us best; and when our consumers—when any consumer—can bring a charge of dishonesty or unfair dealing, then will be the time to make a charge against us. But until that happens—and I am not afraid of it happening—we have the right to be treated as honest men; and until the County Council learn to do that, there will always be strained relations between us and them. I wish to say further, about our attitude to the public, that the members of this Board consider they have a triple duty to perform. First of all, they have to consider the shareholders. The shareholders must come first, because they founded the Company. They have to see that justice is done to the shareholders—that fair treatment is given to them, and that their property is protected. Then the next thing is they have to see that their consumers are honestly and considerately treated; and here I should like to make a remark about something that has been in the paper within the last few days about Police Court proceedings. It is not the practice of the Company to take Police Court proceedings against any man, unless there is clear evidence of fraud. As far as the consumers by slot meter are concerned, we have 155,000 of them. I have just asked the Secretary whether we have taken any of them to the Police Court; and he says not to his recollection. He does not remember that we have taken one. We somehow get them to deal fairly towards us without taking these proceedings; and what we feel is this: We wish to deal considerately with these people, because to take a man into the Police Court is not a pleasant thing. The Police Courts are for criminals. The Gas Companies do not like to be taken into Police Courts by the London County Council when there is an excess of sulphur to the extent possibly of a hundredth part of a grain, or something like that. We say we are not criminals, and we ought not to be taken there. We try to do as we would be done by with regard to consumers. We do not wish to put them to the inconvenience and disgrace, so to speak, of being hauled up before the Magistrates, if we can possibly avoid it; and, in fact, I may say that, as a matter of policy, the officers of this Company always act on these lines—that they would never go before a Magistrate in any case unless they were sure of winning, unless they were sure of getting the Magistrate's sympathy, and that it was a case which ought to be prosecuted. In such cases, we have not hesitated to do so. I do not know that I can take up more of your time. I have been quite long enough; but the point I wish to impress on all shareholders in Gas Companies is that what we want in the public interest is more freedom—freedom to supply the article that the public most need—and in these days of competition we feel we have a right in asking for such freedom. I have great pleasure in moving the adoption of the report.

Mr. JOHN MEWS: Ladies and gentlemen, I have much pleasure in seconding that motion; and after the very interesting speech of our Chairman, there is very little left for me to say. But I think perhaps it might be useful if I were to call attention to the fact that there has been a considerable outlay of capital this half year. As you will see by the report, we have had to pay £80,000 for some tar works. The capital, as you now know, is raised by going first to the consumers and then to the public and the shareholders. It is a great point, I think, in the policy of the Company, that we should try to make its basis as broad as possible; that is to say, we should try, if we can, to get a smaller class of investors to come and take shares in the Company, and not go to the great men who have perhaps very large holdings in this and other undertakings. It would be much better for the Company and for ourselves if, instead of having 500 shareholders who have an average holding of £10,000 each, to have 10,000 shareholders with an average of £500 each.

The CHAIRMAN: Down to £5.

Mr. MEWS: £5 is the least we can take. When we have to issue fresh capital, consideration is always paid to the smaller shareholders. People who come in and ask for a very large allotment are not able to get the whole of it, unless, of course, there should be a dearth of applicants. I may also say that our mode of proceeding in this respect entails considerably more labour on the staff, and also to some extent, upon the Directors. But this policy is a well-settled one; and, whatever trouble it may cause the staff to issue stock in these small amounts, we certainly shall continue to give whatever time and trouble may be required to do it. With these remarks, I beg to second the motion.

The CHAIRMAN having invited discussion,

Dr. DRYSDALE asked what was meant by "fuel gas." Was it the same as water gas or carbonic oxide.

The CHAIRMAN: It is gas of low illuminating power. We do not supply any water gas at all.

Mr. H. W. SMITH called attention to the item of £234,565 under the head of "Sundry stores," which he said appeared to him to be a very large sum; and he asked the Chairman if he could give him any idea of the leading items that went to form this amount.

The CHAIRMAN: £100,000 of it is barges and tugs.

Mr. SMITH thought it would be as well that the leading items should be enumerated.

The CHAIRMAN: I am afraid it would make a very long list.

Mr. SMITH said he had recommended some of his friends, who were also consumers, to take stock in the Company. But, on looking into the accounts, they had felt some alarm at seeing this item of £234,000; and when they had come to him and asked him to explain it, he had told them it was made up chiefly of meters, cast-iron pipes, fittings, and the like. His suggestion as to greater detail was only intended to apply to barges and the more expensive items.

Mr. QUAYLE asked how the sale of gas and the revenue therefrom compared with the corresponding half of the previous year, and whether it would not be advisable to make the comparison in the reports, as perhaps not all the shareholders kept those for the previous year. He thought it desirable they should know, not only over periods of thirty years, as in the Chairman's very interesting retrospect, but from year to year, how the Company progressed and the sale of its products increased. Another question was as to the reserve fund. He did not see in the accounts any particulars as to how the reserve fund was invested. In case it was invested in Consols or Government stocks, had the cost of them been written down to the present depreciated price of most gilt-edged securities? They knew that the joint-stock banks, and other companies also, were, as a precautionary movement, writing down their reserves; and he thought it desirable that no figures of a misleading character should appear in stating the amount of the reserve fund. He would also inquire whether the Directors were doing anything to meet the increasing competition—competition that would become more keen—with regard to electricity in the immediate future, in view of pressing measures that the London County Council were taking, in the way of bringing before ratepayers who were not consumers the advantage, in point of economy, of using incandescent gas rather than electric lighting. He was told that, on the other side of the water, the Gaslight and Coke Company were making a very effective demonstration of how consumers might obtain a better light at a lower cost by using incandescent gas than by using electric lighting. If the South Metropolitan Company would give a similar ocular demonstration, so that those who passed by could see, at a glance, the benefit of the incandescent system, it might be an advantage. He also thought the Company might take better steps to bring before the general public other than their consumers the advantages offered to users of gas for power and heating purposes. When he began to consume gas for these purposes not very long ago, he could not get information upon these points.

The CHAIRMAN: Whom did you apply to, Sir?

Mr. QUAYLE said he made inquiries from collectors, and also from inspectors. They sent up to look at his premises when he told them what he wanted; but they could not give him any very explicit information. All that they gave him was a prospectus of certain gas-stoves—heating stoves and so forth—that the Company sold or hired out. He thought if the Company were to send round, not only to their customers, but to the ratepayers generally, occasional circulars showing the advantages of becoming customers, and giving a few particulars of what the Company were prepared to undertake, even in the way of supplying and keeping mantles and burners in order, it would be an advantage, because he found among his immediate neighbours a great amount of ignorance on these points, which ignorance the Company were not taking any very active measures to dispel.

A PROPRIETOR asked, with regard to the issue of stock to consumers, whether it was found that such stock was well taken up. Some years ago, he bought some stock in the Company at 140; to-day it was somewhere about 119, and a little while ago it was 112. He asked this question for the reason that he was told by the Stock Exchange people that they could always get as much stock as they wanted from the Company at the price of issue to the consumer.

The CHAIRMAN: That is untrue, absolutely.

The PROPRIETOR: I am much obliged. If this were so, one could understand it.

The CHAIRMAN: It is absolutely untrue.

The PROPRIETOR: I am hoping to see my stock go up again to 140.

The CHAIRMAN: With reference to "sundry stores," I think I might supplement what I told that gentleman (Mr. Smith) by saying that nearly all the moveable property of the Company is not charged to fixed capital but is charged in this item—among other things our machinery for drawing and charging retorts. Then we have recently taken over the tar-works. We paid £80,000 for the works; and more than £20,000 had to be paid for stores and things of one sort and another. Everything, meters not in use, pipes—well a hundred things, or perhaps a hundred and fifty—are all included in "sundry stores." There is full value for this item I can assure you. We might transfer the barges to the capital account and swell this account by £100,000, and reduce this item by that amount; but the sundry stores, I may tell you, are tenants' capital, and are regarded for certain purposes as tenants' capital, and we have the right to put these items under this heading. As to the corresponding half year, we usually give the really important item—that is, the increase of business. It has been somehow omitted this time; but the increase of business over the corresponding half year is 2·8 per cent. The increase is not so large as it would otherwise have been, because we have been doing all we could in order to induce consumers to adopt the incandescent mantle. There would be considerable difficulty in putting in these figures; and I must confess I have never seen any use in publishing figures alongside of the corresponding half year. As to the reserve fund, the reserve fund of a gas company is a totally different thing from that of a bank. The reserve fund of a gas company is an accumulation of years for the purpose of meeting some extraordinary and unexpected loss—quite distinct from the trading or revenue account. We have been building up this reserve fund for many years; and the principle adopted in gas accounts has always been this: The amount credited to the reserve fund is the sum the investments have cost. Well, taking an average of years, we have gained much more than we have lost. The investments in the last few years have gone down; but previously they had continuously and largely increased. If we were to write down, we ought to write up; and I am afraid it would introduce an element of confusion into the accounts, and would be of no advantage. What it comes to is this: Supposing these investments and the reserve fund are £5000 less value than they appear in the accounts—instead of £153,000, they might be £148,000. Well, if we should have a loss or an unexpected demand which would require £50,000 to be taken from our reserve fund, we should have plenty to take it from; and only when the reserve fund is exhausted should we realize any inconvenience from the loss. The gentleman who spoke last said he hoped his stock would go up to 140; and before the reserve fund is to be touched, I have very good hopes that, whatever loss there might have been been—and it is not very much—will be recouped, and that the reserve fund will sell for more than it appears in the accounts. I may tell you that during the last three or four years we have not invested anything. There is £52,000

of this £153,000 not invested. We reached £100,000 a good while ago. Since then we have not invested anything, but are simply using the money in the business. The question of investing this further amount came up at the Board the other day; and the Directors decided that, in view of the uncertainty of the Money Market, it was not advisable to invest any more at present. Then about competition, the gentleman who spoke of this refers to the other side. Well, the other side are simply following us quite a long way behind. It was we who started the exhibition of what could be done with incandescent lighting. It was this Company who offered to the City Corporation to fit up incandescent lights on Southwark Bridge—some years ago, that is. We offered to fit them up, and to take them down again if the Corporation did not approve. If they did approve, they were to pay the cost of putting them up. The lights were such a success that the Corporation very soon decided that they would pay the cost of putting them up. They went further, and said: "Will you undertake the lighting of Blackfriars Bridge?" We replied that Blackfriars Bridge, with the exception of six lamps, was lighted by the Gaslight and Coke Company. They said they would like us to undertake it; and we did undertake it. We put up an installation for the lamps on the north side of the bridge. This was completed with the Gaslight and Coke Company's gas; and they had the benefit of it. Also, three or four large standards at the north side of Blackfriars Bridge have been fitted up by us for the Gaslight and Coke Company's gas. These standards have converted the City Corporation to incandescent lighting; and we were approached repeatedly and asked to undertake the management of the incandescent gas lighting in the City. But we thought that was going a little too far, as we did not supply the gas; and so we said we could not do it. We, in conjunction with the Commercial Company, have lighted the Tower Bridge. All four of the City bridges will have incandescent gas. I may say that, within the last few months, the Gaslight and Coke Company have appointed a new Manager of this department; and he is now doing all that he can to push incandescent lighting. As to taking more steps to give our consumers information, we will take all the steps possible; I thought we were doing so. We have a separate canvassing staff; and with regard to new houses, we look after them, not only when they are being built, but before they are built, to make arrangements for putting gas into the houses. I cannot, therefore, understand how it is this gentleman should have made inquiries and have got no assistance; but we will look into it, and see how it is. I can only tell him we have forwarded circulars to every consumer that we will supply improved flat-flame burners free of cost; and in the same circular we state that it will be worth while to adopt incandescent lighting, giving the cost and all the rest of it. These circulars have been sent to every consumer throughout the Company's district, within the last two years. A hundred men are now employed in attending to the mantles of the consumers. Then as to the issue of stock to consumers, I answered that gentleman's question about the Stock Exchange. The consumers are taking the stock up very freely; and we have no doubt that before the time expires the £100,000 of this stock will be taken up by consumers of the Company. I bought some at 140; and now it has gone down to 120. But that is one of the vicissitudes of the ownership of property. Everything else has gone down. Consols have gone down more than our stock. All I can say is that, as far as the value of the stock is concerned, if a man does not want to sell, it does not affect him at all. His dividend has not gone down. The dividend to be paid this half year will be as high as has ever been paid by the Company, and I hope next half year it will be a little higher; so that if a man invests for the sake of income, his income is not affected at all, and there is no reason to suppose that his income will be affected. We shall be glad to place ourselves in communication with the gentleman who spoke last, to find out where our people failed to give him the information that he required.

The resolution was then carried unanimously.

The DEPUTY-CHAIRMAN (Mr. Simpson Rostron) moved—"That a dividend at the rate of 5½ per cent. per annum be now declared, and that the warrants be transmitted to the registered addresses of the proprietors by post." He said there were one or two facts with regard to the Company's business which he thought the proprietors would appreciate. In the first place, in consequence of their having obtained authority to manufacture and sell gas of lower illuminating power, they were enabled to extract a larger number of cubic feet per ton of coal than formerly; and the proprietors would be glad to hear that this half year, as compared with last, the Company had been paid for no less than 380 cubic feet more for every ton of coal turned into gas. This was a very important fact, as showing that the article they supplied could be produced in larger quantities practically at less cost. Another even more important fact was the way in which the gas was consumed. As the Chairman had told them, the rate of increase latterly had not been quite up to the old standard; and this was due to the large spread of incandescent lighting, which might be described as a friend in disguise. It gave five or six times the amount of light from the same quantity of gas. But incandescent lighting was only one thing. There were also the gas-fires and gas cooking-stoves; and they would also be pleased to learn that the number of people using gas-stoves had increased at a far greater rate than the number of new consumers. With regard to slot consumers, it was said by many people: "Oh, you will soon get to the end of them." But there was as yet no sign of this; the fact being that the number of slot consumers was larger than ever before, and there were 2000 more of these consumers using gas-stoves than there were new consumers. As regards the ordinary consumers who burned more gas, the number using gas-stoves was about two-and-three quarter times as many as the number of new consumers. He thought the proprietors would appreciate the value of these figures, as they showed that the business was on a very solid foundation; and the forecast of the Chairman as to the dividend being increased next year was likely to be realized, so long as they increased their consumption and the number of their customers.

Mr. J. A. BUTCHER (workman Director), in seconding the motion, said he thought they might congratulate themselves upon the very large attendances at the half-yearly meeting. Speaking from the workmen's point of view, he was glad to give assurance of the stability of the Company. He had watched the progress and development of what was originally called the profit-sharing scheme, which had grown to be more and more important year by year, until it occurred to Sir George Livesey that the term "profit-sharing" was inappropriate. The word "co-partnership" had now been adopted, and shareholders, consumers, and employees were all working in the same interest. Consumers benefited by the low price charged for the gas; shareholders benefited by the reduction in price and the increase of their dividend; and the employees by their bonus being increased.

A PROPRIETOR asked what steps were being taken to watch the proceedings of the different Municipalities in regard to electric lighting, so that the cost should not fall on the rates. Knowing the difficulty of electric light undertakings in making both ends meet, he was very suspicious that some of the incidence of the cost of electric lighting might have to be paid with the rates.

The CHAIRMAN: A very, very important question; and before putting the resolution I will answer it. The question as to the incidence of the cost of electricity was raised two or three years ago. The Bermondsey Borough Council were then framing an Electric Lighting Order; and the Company opposed it with the view to getting inserted a proviso that the Council should year by year keep accurate accounts, and prepare an estimate, at the beginning of the year, of the price necessary to enable them to make the revenue balance the expenditure. Well, this was two years ago; and that form of Order has been adopted and followed in a good many cases throughout the country. The clause is known as the "Bermondsey Clause," and the effect of it is that the undertakers shall year by year make the revenue balance the expenditure. We did this not in our own interests only. When we proposed it, they said: "We will give you a clause which will exempt you from paying these rates;" but our Counsel said: "No, we do not want it for ourselves; we want it for the general body of the ratepayers—we want a clause that shall suffice for all ratepayers." What we asked was to have the electric lighting accounts of all these Borough Councils investigated, so that, if they were not charging a sufficient price to make both ends meet, we might put the Act in force. This we are now doing; and I recommend all gas companies to do the same, because it is an abominable thing that they should have to pay the loss on electric lighting. In a borough with which I am acquainted, there are 4000 ratepayers, and 200 electric light consumers. The electric lighting does not pay, and an extra rate of some 4d. in the pound is levied on the whole 4000; and the 200 get the benefit of it. It is an abominable thing.

The resolution was then adopted.

The CHAIRMAN next moved the re-election of Mr. Robert Morton as a Director of the Company. Mr. Morton had been actively engaged in the manufacture and supply of gas all his life, and was a most valuable Director.

Mr. H. W. SMITH seconded the proposition, which was unanimously adopted.

The CHAIRMAN proposed the re-election of Mr. John Ewart, whose experience as a City merchant was of great value. To the diversified talent of the Board, Mr. Ewart contributed his full share.

Mr. SMITH seconded the proposition, which was carried unanimously.

Mr. EWART, in acknowledging his re-election, said it was rather more than fifteen years since the proprietors first did him the honour of electing him, and in that interval many things had changed—the capital of the Company for one thing; this being now nearly double what it was at that time. The work of the Board had also increased, if not quite proportionately, to a large extent. Still, there were now more Directors to share it. Their anxieties and responsibilities had increased; but somehow or another they had managed to hold their own in face of increasingly active competition, and he hoped they would do so in the future.

On the motion of Mr. GUYER, seconded by Mr. FOSTER, Mr. Thomas S. Soden was re-elected Auditor.

Dr. DRYSDALE proposed—"That the warmest thanks of the meeting be tendered to the Directors for their admirable conduct of the Company's affairs during the past year." There were several things in the speech of the Chairman which had interested him exceedingly. The first was with reference to the smoke nuisance. All in London had contemplated the increasing quantity of smoke with great dismay, and there had been many plans suggested for getting rid of it. But the only proposal of the least importance he considered was the one which fell from the Chairman with reference to the use of gaseous fuel. Another interesting point was that mentioned by one of the Directors as to their having had 380 cubic feet of gas more per ton of coal. As to so large a number of workmen being co partners in the institution, he considered that to be by far the most important fact within his knowledge of Sociology; and he looked forward to the time when the whole of the business of the country should be carried on on similar lines. He thought, therefore, that, in introducing the co-partnership system, the Chairman had done a very great service.

Mr. H. W. SMITH having seconded the motion,

The CHAIRMAN said: It is one of the pleasures of life that comes twice a year to receive this vote of thanks. I think they become warmer and warmer as the years go on. I am very much obliged to Dr. Drysdale for the very cordial manner in which he proposed this vote. Speaking for my colleagues, I may say that they have endeavoured to do their duty to shareholders, consumers, and employees. They wish to deal justly with the shareholders, justly and considerately to the consumers, and justly, considerately, and kindly to the employees. This is the feeling of every member of the Board. I am not speaking for myself only, but for every member of the Board when I say that this is the principle and feeling which animates them. I have one other duty to perform, and that is to propose a vote of thanks to the officers of the Company—the officers of all grades and to the employees generally. It is not merely officers now. We are all co-partners—shareholders, consumers, and employees are all in this co-partnership. The 2d. reduction will give the consumers £96,000 in the year; it will entitle the shareholders to an extra dividend, but they will only receive £10,000 in the year; and it will entitle the employees under the co-partnership system to £5000 increased bonus on their wages and salaries.

So that, while the consumers get (say) £100,000, the shareholders get £10,000, and the employees £5000, This is true co-partnership; and I think it is fairly divided among the three parties. I may say it is one of the great pleasures of life to be associated with this Company now that the relations are as they are between Directors and employees. The General Manager of a railway said to me, at a gathering of Directors and workmen connected with the Crystal Palace District Gas Company, "This is like Heaven." He had had a large experience as a Railway Manager, and knew what the relation was between employer and employed. He said: "This is like Heaven;" and really it is. We have not had a single disagreement or approach to disagreement or anything of the kind between employer and employed, since we adopted this principle. The only astonishing thing to me is that others do not follow our example. I do not know why they do not. I have now the greatest pleasure in moving the hearty thanks of this meeting to our employees of all ranks, for their willing service and their devotion to our interests, with special reference to Mr. Carpenter, the Chief Engineer, and Mr. Bush, the Secretary.

The DEPUTY-CHAIRMAN said he seconded the motion, with the very greatest pleasure. Without the excellent heads of their staff, the labours of the Board would be in vain; and he could assure the proprietors that in their present staff they had all they could desire.

Mr. CARPENTER, in acknowledging the compliment, said, with reference to the increased make of gas per ton, it was satisfactory to the carbonizing branch of the engineering staff to feel that they had sold more than 10,000 cubic feet per ton of coal. This had been done for the first time in the history of the Company. When they remembered that the Company employed, in round numbers, some 5000 workmen, and that their work was scattered more or less over the 50 square miles of which the district consisted, they would realize how important it was to be on good terms with their workmen, and that the workmen also should do their best for the Company. It would be impossible to watch and control them; and no system that he had ever heard of could equal that of co-partnership for bringing them into line, and making them feel that they were working for something in which they had an interest. A little while ago they had some rather unexpected testimony to this fact. They had to lay somewhat hastily a main in a busy thoroughfare in Norwood; and one of the shopkeepers thought they were interfering rather unduly with his premises, and wrote an anonymous letter to the papers on the subject. The following week another gentleman, who signed his name, wrote a letter from which he (Mr. Carpenter) would like to read a few words, as affording unsolicited testimony to the methods of the Company's workmen:—

> One is so often compelled to grumble against public bodies, that it is quite a treat to praise them; so kindly indulge me the luxury of bearing testimony to the conscientious and intelligent way in which the workmen have toiled. I once saw eighty workmen (?) in a trench near London Bridge, in various languid attitudes, not one of whom struck a stroke for their employer (whoever that might be) while I was looking. But I have had a full view of these gas men all the day (it is so nice to watch other people work!), and have never detected them shirking or scamping for a single moment.

With regard to the question of educating the consumers, a great deal of work had been done in that direction. A special staff was employed for the purpose, and their work came before the proper authority every month; and how they came to miss the gentleman who had spoken that afternoon he could not imagine. As to the public lighting of the bridges, he might tell the proprietors that the arrangements for lighting London Bridge had been placed in their hands, though they were not to supply the gas.

Mr. BUSH also acknowledged the vote. With reference to the amount of stock of the employees, he stated that five years ago they held in stock and on deposit £133,000. To-day the amount was not less than £200,000; and the number of employees holding stock was about 4500. The stock was being well taken up by consumers. Applications had been received for £76,000; and there was another week in which they might come in. Allusion had been made to the slot-meter consumers. The number at present was 156,000; five years ago it was 74,000. The rental from these consumers was just below £200,000 in 1898; for the year 1903 it came to £391,000. So that the amount had nearly doubled itself in five years, and all in pennies; the number of these taken in the year being nearly 94 millions.

COMMERCIAL GAS COMPANY.

The Half-Yearly Report and Accounts.

The following is the report of the Directors of this Company for the six months ended Dec. 31, which, with the accounts, will be presented at the meeting of the proprietors on Thursday.

The Directors submit the accounts for the half year ended Dec. 31, 1903. The revenue account shows a net profit for the half year of £62,684 7s. 5d., which, added to the balance of £16,509 12s. 10d. brought forward, produces a net revenue balance of £79,194 0s. 3d. Deducting therefrom £8195 4s. 10d. for interest, there remains standing to the credit of the net revenue account a balance of £70,997 15s. 5d. available for dividend. The Directors recommend the payment of dividends thereout at the rates of £5 4s. per cent. per annum upon the 4 per cent. stock of the Company, and of £5 per cent. per annum upon the 3¼ per cent. stock, both less income-tax. The balance of the net revenue will be carried forward to the next half year.

The accounts accompanying the report consist of the usual statements. They show that the paid-up stock on the 31st of December amounted to £834,610; that £1,076,875 had been added on conversion, making £1,911,485; and that £323,515 was unissued out of the £2,235,000 authorized (including premiums). The total amount borrowed on the above-named date was £307,010, and £135,937 10s. was added on conversion; making a total of £442,947 10s., and leaving £107,052 10s. to be borrowed out of the £550,000 authorized. The receipts on capital account amount, with premiums, to £2,404,564 4s. 10d.; the expenditure stands at £1,231,158 6s. 3d., with a nominal amount of £1,212,812 10s. added on conversion—together, £2,443,970 16s. 3d. There is consequently a balance of £39,406 11s. 5d. carried to the balance-sheet. The expenditure on capital account in the half year was £34,929 18s. 6d.; the largest items being £7418 for new and additional stoves, and £13,531 for prepayment meters and fittings. The reserve fund amounted on Dec. 31 to £30,626, and the insurance fund to £29,490. The following is the revenue account:—

REVENUE ACCOUNT.

Expenditure.

Manufacture of gas—			
Coals and oil, including dues, carriage, unloading, and trimming	£84,535 12 3		
Salaries of Engineer and officers at works	1,467 10 0		
Wages (carbonizing)	17,920 8 11		
Purification—including £3394 10s. 1d. for labour	6,508 0 11		
Repair and maintenance of works and plant, materials, and labour, less £273 14s 9d. received for old materials	29,175 15 7		
		£140,007 7 8	
Profit sharing		2,614 8 3	
Distribution of gas—			
Salaries and wages of officers and rental clerks	£2,652 8 9		
Repair, maintenance, and renewal of mains and services, material, and labour	5,217 2 8		
Repair and renewal of meters	1,742 16 9		
" " " " stoves	3,333 9 11		
" " " " prepayment meters and fittings	3,918 6 11		
Incandescent mantle maintenance, &c.	1,050 4 10		
		17,914 9 10	
Public lamps—lighting and repairing		3,031 13 6	
Rent, rates, and taxes		9,276 8 2	
Management—			
Directors' allowance	£1,250 0 0		
Company's Auditors	75 0 0		
Salaries of Secretary, Accountant, and clerks	1,064 10 0		
Collectors' salaries and commission	1,616 13 5		
Prepayment meter collection	912 2 11		
Stationery and printing	846 1 5		
General charges	968 19 0		
		6,733 6 9	
Bad debts		983 18 0	
Law and parliamentary charges		189 11 2	
Superannuations and allowances		1,2 4 4 2	
Official officers		121 15 3	
Total expenditure		£182,113 2 9	
Balance carried to net revenue account		62,684 7 5	
		£244,797 10 2	

Receipts.

Sale of gas—			
Common gas per meter at 2s. 6d. (50,850)	£172,501 16 7		
Public lighting and under contracts, common gas	7,741 4 11		
	£180,043 1 6		
Less discounts and allowances	2,810 18 3		
		£177,232 3 3	
Rental—			
Meters (21,061)	£2,809 11 7		
Stoves (23,013)	3,514 4 5		
Prepayment meters (25,890)	6,535 7 0		
Incandescent mantle maintenance	476 2 4		
		13,335 5 4	
Residual products—			
Coke, less £5449 4s. 7d. for labour	£34,012 17 10		
Breeze, less £636 7s. 4d. for labour	1,877 19 2		
Tar	8,020 5 3		
Ammoniacal liquor and sulphate of ammonia	10,082 5 9		
		53,993 8 0	
Miscellaneous receipts—			
Rent receivable	£201 3 7		
Transfer fees	35 10 0		
		236 13 7	
Total receipts		£244,797 10 2	

The following are the statements relating to the manufacturing operations of the Company in the half year:—

Statement of Coals and Oil.

Description.	In Store June 30, 1903.	Received During Half Year.	Carbonized During Half Year.	Used and Sold During Half Year.	In Store Dec. 31, 1903.
	Tons.	Tons. cwt.	Tons. cwt.	Tons.	Tons.
Common	28,353	101,935 11	107,429 11	601	22,258
Cannel	2,518	..	..	10	2,508
Total	30,871	101,935 11	107,429 11	611	24,766
Oil—gallons	164,492	1,104,297	1,040,435	..	228,354

Statement of Residual Products.

Description.	In Store June 30, 1903.	Made During Half Year.	Used During Half Year.	Sold During Half Year.	In Store Dec. 31, 1903.
Coke—tons	3,810	65,800	17,726	43,923	7,961
Breeze—tons	200	12,948	..	12,793	355
Tar—gallons	644,666	1,109,103	..	899,424	854,345
Ammoniacal liquor—butts	3,769	33,680	32,648	..	4,801
Sulphate of ammonia—tons	62	1,025	..	1,062	25

Statement of Gas Made, Sold, &c.

Quantity Made (meter register and estimated).	Quantity Sold.		Total Quantity Accounted for.	Number of Public Lights.
	Public Lights and under Contracts (estimated).	Private Lights, per Meter.		
Thousands.	Thousands.	Thousands.	Thousands.	
1,560,638	48,273	1,381,419	1,453,592	4345

CRYSTAL PALACE DISTRICT GAS COMPANY.

The Further Application to Parliament for Relief from Restrictions.

The Ordinary Half-Yearly Meeting of this Company was held last Friday at the Albion Tavern, Aldersgate Street, E.C.—Sir GEORGE LIVESEY in the chair.

The SECRETARY (Mr. Charles M. Ohren) having read the notice convening the meeting, it was agreed to take as read the Directors' report and the accounts, from which some extracts were given in last week's issue.

The CHAIRMAN said it was his duty to move—"That the report of the Directors and the accounts be received, adopted, and the report entered upon the minutes." Happily, the Company's position that day was one which could not be regarded otherwise than as satisfactory. They had had a successful half-year's working. More than the dividend had been earned; and they were going to recommeud the payment—he would not say of the full dividend (because the dividend was £5 7s. 6d. per cent.), but for convenience they were recommending £5 6s. 8d., which avoided fractions of a penny in dividend warrants. They were also able to increase the balance carried forward from £2600 to about £4300. In the half year, too, they had met the very heavy charge of £3300 for parliamentary charges. Further, the Directors considered they were now in a position to reduce the price of gas, and notice had already been given of a reduction to 2s. 6d. per 1000 cubic feet. This would enable them to increase the divdend to 5½ per cent. A reduction of 1d. in the price of gas entitled them to pay an extra 2s. 6d. per cent. dividend. The 2s 6d. per cent. was not enough to divide by itself; but seeing they had 10d. in hand (as he had said, they had a right to £5 7s. 6d., but they only paid £5 6s. 8d.), the other 2s. 6d. would bring them up to 5¾ per cent. He therefore hoped that next half year the Board would have the pleasure of recommending the payment of the full dividend to which the proprietors were entitled under the sliding-scale. There were very few other matters in the accounts to which he need refer; but while he was on the question of dividend, he might say that, by the economy with which the Company had carried on their business, particularly in the way of extensions, the increase of capital (which had been raised at the market price of the day) had been kept very low. Now, and for many years past, it had been required, by the Standing Orders of Parliament, that all new capital should be raised under the auction clauses, which meant that it should be raised at the market price of the day; so that the cost to the Company, or rather to the consumers, for the new capital (instead of being as was once the case 7 and sometimes 10 per cent.) was now only about 4¾ per cent. By cheap capital, and by economies in spending their capital, whereby the business, so to speak, had increased, at a much greater rate in proportion to the capital, the amount required to pay the dividend upon it had gradually come down. Whereas it used to be a very common thing for the dividend to require as much as 1s. per 1000 cubic feet of gas, they had now got down to less than 7½d., or, to be exact, to pay the full dividend and the interest on the debenture stock, required 7·4d. per 1000 cubic feet, which was a low figure. This had been one of the great reasons whereby the Directors had been able to reduce the price of gas as they had done, because, during the last ten or twelve years, other expenses had not gone down. Coal was considerably dearer than it used to be, labour was dearer, and so were materials generally; but the charge for capital had materially decreased. Consequently, they were now in a position to sell gas at 2s. 6d. per 1000 cubic feet, which, he thought, for a suburban district was a very satisfactory figure; and he believed and hoped their consumers would also regard it as such. At the same time, he should mention that these gratifying results had not been effected by starving anything. The works had been maintained in full efficiency; and everything, in fact, which could fairly be charged to revenue had been so charged, and as little as possible to capital. The main item charged to capital was £3282, which was nearly all for additional land lying between their works and the railway station, which the Directors thought it very desirable to acquire rather than let it be sold for building purposes, and have new houses erected close to the works, and then possibly complaints against the Company. This purchase of land accounted for nearly the whole of the £3282—very little of it had been spent on the works. The other items of capital expenditure were for mains and services and new and additional meters and stoves, which all applied to the district. This meant that the demand for gas was growing, and had necessitated this expenditure on account of distribution. He might say, with regard to the working, the cost of carbonizing per ton of coal, had gone down to below 2s. This was due to two things—one, the adoption of machinery almost exclusively for the work, and the other the way in which the men operated the machinery. Instead of causing it to do as little as possible, he thought he might say of the men that they tried to get as much work out of it as it was capable of doing. Coal had been 8d. per ton cheaper; and they had received 6d. per ton more for products. Therefore the net cost of coal was 14d. less than it was a year ago. All these things put together accounted for the prosperous condition of the Company. Now he wished to touch on another subject; but he need not go into it at length, because the report itself explained practically all he had to say in regard to it. This was the point: The gas industry had come (as it were) to the parting of the ways. The circumstances now under which gas was supplied were so totally different from those under which it was supplied years ago, and which induced Parliament to impose certain regulations and restrictions, that it was felt the time had come when they must have relief, and not in their own interests only. When the Company's Bill was before Parliament last year, one of the Counsel had the audacity (he advisedly said "audacity") to say in his speech to the Committee that everything the Company proposed was for the Company, and nothing for the consumers. This was an absolute reversal of the fact. Practically everything was for the consumer, and nothing for the Company—at any rate, it was in this proportion, the consumer would get £5000 and the Company only £700 of the benefits which would accrue. This man, as he said, had the audacity to put it the contrary way. Instead of the public authorities working with the Company for the good of the consumer, they seemed to think the Company were not to be trusted in any respect or degree whatever, and opposed and objected to everything that they proposed. Now since the sliding-scale was introduced, gas companies and consumers had been made partners; and it was certainly to the interest of the companies to do the best they could for the consumers. Therefore the Directors claimed that all the Company were proposing in their Bill was with the view of helping the consumer, because if they did not help the consumer, it was certain the consumer would not help the Company, and then they would lose their business. The Directors had therefore resolved to reintroduce the Bill in the present session. Years ago, it was a very easy thing for gas companies to supply 15 or perhaps 16 candle gas. They could not do it now. They could not get gas of that quality, not nearly 15-candle—at any rate in London—from the available supply of coal. Therefore, to meet the requirements Parliament had imposed upon them, they must enrich the gas, by mixing it with another gas. He was prepared to say and prove that these mixtures were very disadvantageous to the consumers. What the consumer wanted was a gas of uniform quality, because a very large proportion of it was now used for heating, cooking, and purposes other than lighting. It was now used largely in bunsen burners, which were constructed to admit a certain proportion of air. If the quality of the gas varied from time to time, the quantity of air admitted at one time was not the right quantity at another. The result was the combustion of the gas was not so perfect as it would be if the gas were always of a uniform quality, as it would be if made entirely from coal. As to the Bill they were promoting in Parliament, he would deal with that presently, at the Wharncliffe meeting. He had only one other reference to make to the report. One of the paragraphs spoke of the profit-sharing system. He had never liked the term "profit-sharing?" It always seemed to imply, What about loss-sharing? Moreover, it did not express what they were doing. Some seventy years ago the great Mazzini made this historic statement: "The position of the labourer was originally that of the slave. He then rose to the condition of serfdom, and then to that of hireling; but his ultimate position must be that of the partner." Now this, he (Sir George) thought, was a true prophesy; and it was the true solution of the great labour question. The labourer must become a partner if they were to have peace, good work, and satisfactory results permanently and thoroughly. The Company were going on these lines. The bonus paid to their employees—from the chief officers to the humblest servant—was a certain percentage on their wages dependent on the price of gas. For every penny the price of gas was reduced, the bonus to the employees was increased by ¼ per cent. on their wages. This gave them a direct interest with the shareholders in reducing the price of gas; and this constituted a triple partnership—they might call it a co-partnership of the three interested parties. They had adopted means of inducing the employees to invest their money in the Company; and the response made to the efforts of the Directors had been most loyal. Nearly the whole of the money that had been appropriated to the employees under the co-partnership system had been invested in the Company's stock—to the amount of nearly £15,000, besides which there was a good sum on deposit. By these means, the whole of their interests were identified; and he thought he was justified in saying that the relations of the Board and the officers and employees were of such a character as could not have been conceived if they had been told of it fifteen years ago. The Directors now proposed in the Bill the Company were promoting to give power to the employees to elect some of their number to sit on the Board. This had been tried in the case of the South Metropolitan Gas Company, and had been in operation since 1898, with astonishingly successful results.

Mr. C. LEA WILSON seconded the motion.

Mr. G. T. POWELL congratulated the Board on the successful half-year's working. He did not think many persons in commercial businesses could show such a favourable report for the past six months, whatever their trade or business. They were carrying forward double the amount of money which they did on the last occasion, and had the prospect of the full dividend being declared next half year. These results had been attained, as the Chairman had told them, notwithstanding the fact that coal, wages, and other materials were dearer than formerly. He also looked upon it as most satisfactory that the efficiency of the whole undertaking had been looked after in the best possible way. Better perhaps too than everything else was that they had the goodwill of their workmen. When masters and men went well together, all must go well for the proprietors. He was very disappointed that the Directors and proprietors had been worried and disturbed by the London County Council, who had succeeded in getting thrown out a Bill which the Directors thought was so desirable, and which it was desirable should be made into an Act of Parliament. If ever proof was needed that the London County Council had better attend to their own business and not to that of industrial concerns, which they did not even understand, they could not have a better instance than this. He trusted sincerely that, with the efforts which would be made by the Board in the coming session, they would be able to get over the difficulty and so benefit both the consumers and the proprietors very greatly indeed.

The motion was unanimously carried.

On the proposition of the DEPUTY-CHAIRMAN (Mr. Robert Morton), seconded by Mr. JABEZ LIGHT, dividends were declared at the rates per annum of 5 per cent. on the preference stock and 5⅓ per cent. on the ordinary stock, less income-tax.

In terms recognizing the great services of the Chairman to the Company, the DEPUTY-CHAIRMAN moved the re-election of Sir George Livesey to his seat at the Board. In seconding, Sir FORTESCUE FLANNERY, M.P., remarked that he did not think anyone outside the Board could realize the amount of influence which the work of their Chairman had upon the success of the Company. Even in the matter in which the proprietors had taken so much interest—the co-partnership among the employees—was entirely his own (so to speak) patented invention; and they had to thank him for the security for their future success, which could only be obtained in large industrial concerns by the harmony of employers and employed.

The motion was heartily adopted.

The CHAIRMAN, in his acknowledgment, said it was a pleasant thing to have to do with these Gas Companies. The only bitter thing about it was the action of some of the local authorities. Everything else was of the pleasantest character. He must correct Sir Fortescue in one particular. The co-partnership system was not his invention. He believed it was a M. Leclaire who started it in a decorators' business in Paris some seventy years ago. [Sir FORTESCUE FLANNERY: It was your free trade import then, Sir.] No; George Thompson, of Huddersfield, a woollen manufacturer, started it in the '80's. But the South Metropolitan Company's adoption of it was, he believed, the first application of it to a great Joint-Stock Company. Before sitting down, he might mention one fact, of which he had been reminded by Mr. Ohren. This was the Jubilee of the Company. Fifty years ago, the first meeting was held; and now they had reached their fiftieth year, and hundredth meeting. Proceeding, the Chairman moved the re-election of Mr. Charles Hunt; remarking upon the Company being fortunate in having the services on the Board of a man of such large experience in gas matters as his colleague.

Mr. LEA WILSON seconded the motion; and it was also cordially agreed to.

Mr. HUNT having acknowledged his re election,

Mr. T. GUYATT proposed, and Mr. NALTY seconded, the re-appointment of the outgoing Auditor (Mr. Samuel Wood, F.C.A.).

The proposition was unanimously carried.

THE WHARNCLIFFE MEETING.

An Extraordinary Meeting was then held to consider a resolution approving of the Bill which had been introduced into Parliament, and authorizing the Directors to proceed with it.

Mr. C. F. T. BLYTH (of Messrs. Blyth, Dutton, Hartley, and Blyth), the Solicitor, briefly explained the provisions of the Bill.

The CHAIRMAN then moved: "That the Bill now submitted to the meeting, intituled 'A Bill to alter the provisions of the Acts of the Crystal Palace District Gas Company with respect to the illuminating power of gas supplied by them and the testing of gas and to change the name of the Company to "The South Suburban Gas Company," and for other purposes,' be approved, and that the Directors be authorized to proceed with the same, subject to such additions, alterations, and variations as Parliament may think fit to make therein and the Directors approve." He said he did not think he need take up much time over this matter. With reference to the proposed reduction of the illuminating power to 12 candles, the reason they inserted this low quality was because they must insert something. But, as a matter of fact, the nominal illuminating power of the gas was of no importance whatever. He believed that on the Continent, where the incandescent mantle got the start of this country, gas was supplied of 8 or 9 candle power—that was to say, it was of this power when burned with a luminous flame. That was quite sufficient for all purposes; and therefore the Directors put in 12 candles, because they must put in something, and because they could get 12-candle gas easily from the available coal supply. Then they repeated the provision regarding the relief they desired from the necessity of purifying the gas from sulphur compounds. The Bill last session passed triumphantly through the House of Commons. They showed to the Committee of that House, that, out of something like 250 local authorities owning gas-works, only two of them had sulphur restrictions at all, and those two ignored them. (Laughter.) They did not trouble any of them to purify their gas from sulphur compounds. He thought he was right in saying that in France there was no such thing as a requirement to purify from sulphur compounds. They were so infinitesimal in amount. There might be three or four gas-works in other parts of the Continent owned by English companies where there were some regulations and nowhere else; but of the English companies, there were only 50 out of some 450 that had sulphur restrictions at all. This fact so impressed the Committee of the House of Commons last year, that they gave the Company all they asked for. The Committee of the House of Lords, however, were so bamboozled by the opposition, and so frightened and confused, that they shunted the matter, and said the Company must wait until the Board of Trade had done something. Regarding the sale of stock to consumers, they had already been doing this; but they had to offer it for sale first by tender. Instead of going this round-about way to work, they asked Parliament to give the Company the option of offering it direct to the consumers at the market price. They found it a very satisfactory way of issuing stock. The consumers were glad to buy it in small amounts—from £5 and upwards; and the Company thereby made friends where they were most wanted. As to the workmen Directors, he had alluded to this point in his first speech. But he might add that in the case of the South Metropolitan Gas Company, a small number of their friends had originally considerable fear as to the results of the change. Mr. Morton could bear him out that even those who were opposed to it were now as satisfied as the rest of them. [Mr. MORTON: That is so.] With reference to the provision as to nomination, this was to save their employees the trouble and inconvenience of making a will. The Government allowed it in the case of Post Office deposits and Friendly societies, and they had with pleasure allowed it in connection with the South Metropolitan Gas Company. So that there would be no difficulty about that. Then concerning the proposed application of the Bermondsey clause to Beckenham, he said it was an unjust thing to supply the electric light at less than cost price to a limited number of the ratepayers in any district, and make up the loss by a charge on the rates. This meant that a small minority of people got their light at less than cost price; while the great majority had to make up the loss. To prevent this was the object of the clause on the subject in their Bill.

The DEPUTY-CHAIRMAN seconded the motion; and, without discussion, it was unanimously carried.

On the proposition of Mr. POWELL, seconded by Mr. G. COSENS, and supported by Mr. H. D. ELLIS, the Chairman and Directors were heartily thanked for their services.

The CHAIRMAN, having replied, moved a similar acknowledgment of the services of the Engineer (Mr. S. Y. Shoubridge), the Secretary (Mr. C. M. Ohren), their respective staffs, and the whole of the workmen, remarking upon the goodwill which existed all round. Reverting to the vote to the Directors, he reminded the proprietors that, a year ago, the Board asked them to allow the Directors' fees to be increased, but gave an assurance that they would not exceed £2200. The proprietors generously agreed to the proposal that they should be advanced to £2500. The Directors had fixed the amount they were to take at £2100. The idea was that, when the time came for another Chairman to be elected, the proprietors had placed the Board in a position to give him an adequate salary, in order to get the best man possible. There was £400, at any rate, which the Board were not taking.

Mr. COUSENS seconded the vote to the officers and employees, and it was unanimously carried.

Mr. SHOUBRIDGE and Mr. OHREN having responded, the proceedings terminated.

SHEFFIELD UNITED GASLIGHT COMPANY.

Half-Yearly Report and Accounts.

The greater portion of the report which the Directors of this Company will present at the half-yearly meeting on the 7th prox. relates to the price of gas. This was reduced on the 1st of April last by 2d. per 1000 cubic feet; and the Directors express their gratification at being able to make a further reduction of 2d., to take effect from the 1st of January last. The Company's charges are now 1s. 8d., 1s. 6d., and 1s. 4d. per 1000 cubic feet; and for engines using 100,000 cubic feet of gas per annum (value £8 6s. 8d.), 1s. 4d. The Directors believe these very low figures will be a great boon to the consumers of gas, whether for domestic or manufacturing purposes, and will lead to its more extended use for the many trade purposes for which it is specially suitable.

The accompanying accounts show that during the six months ending Dec. 31 the sale of gas produced a revenue of £121,554, and residual products yielded a sum of £62,812; the total receipts being £193,793. The manufacture of gas cost £98,744; distribution, £13,429; and management, £5024; the total expenditure being £129,543—leaving £64,250 to go to the profit and loss account. The dividends recommended on the three classes of stock will amount to £43,424; and the profit on the half-year's working will allow of the payment of them, and leave a balance of £21,018. The statements relating to the working show that 127,888 tons of silkstone coal and 13,150 tons of cannel were used in the six months. The make of gas is not stated; but the following are the estimated quantities of residuals produced: Coke and breeze, 86,505 tons; tar, 7625 tons; ammoniacal liquor, 4,318,100 gallons.

CROYDON COMMERCIAL GAS COMPANY.

Half-Yearly Report and Accounts.

The report which the Directors of this Company will present to the proprietors at the half-yearly meeting next Friday opens with the satisfactory statement that the quantity of gas sold in the six months ending the 31st of December last was 8·18 per cent. in excess of that for the corresponding period of 1902. The accounts accompanying the report show that the revenue from the sale of gas amounted to £63,362, compared with £58,865; the rental of meters, stoves, and fittings came to £5563, against £4945; residuals produced £19,691, compared with £16,154; and the total receipts were £88,703, against £80,032. The expenditure on the manufacture of gas was £46,420; on distribution, £10,914; and on management, £2944—the total expenses being £66,427, against £62,569 before. The balance carried to the net revenue account is £22,276, compared with £17,463 at this time last year. The amount available for distribution then was £17,926; whereas now it is £20,472. The Directors recommend the declaration of dividends at the rates of 14½, 11½, and 9½ per cent. per annum on the "A," "B," and "C" stocks; and at the last-named rate for five months on the new issue of "C" stock in July last—all less income-tax. The payment of these dividends will absorb £17,522, and leave a balance of £2950 to be carried forward. The statements relating to working show that 31,241 tons of coal, 3 tons of cannel, and 457,450 gallons of oil were used in the manufacture of 489,713,000 cubic feet of gas, of which 457,984,500 cubic feet were sold and 464,057,600 cubic feet were accounted for. The estimated quantities of residuals made are: Coke, 18,746 tons; breeze, 5567 tons; tar, 396,839 gallons; and ammoniacal liquor, 955,229 gallons.

TOTTENHAM AND EDMONTON GAS COMPANY.

Half-Yearly Report and Accounts.

The report which the Directors of this Company will present at the half-yearly meeting next Saturday shows that the quantity of gas sold in the six months ending Dec. 31 was 459,494,000 cubic feet, compared with 397,244,000 cubic feet in the latter half of 1902. The increase is 62,250,000 cubic feet, or 15·67 per cent. Important alterations and extensions have been made in the mains upon the works, as well as in the governors and distributing plant. New workshops and premises for dealing with gas-stoves and consumers' fittings have been erected upon a site adjoining the Company's chief offices; and plans for further and considerable extensions of the producing plant and machinery connected therewith are in preparation. An agreement has been arrived at with the London County Council, under which the Company will supply with gas the whole of the houses to be erected upon the Council's estate at White Hart Lane. The price of gas has been reduced by 2d. per 1000 cubic feet from the date of the reading of the meters for the past quarter. The accounts accompanying the report show that the profit realized was £18,105. Adding to this the

undivided balance of £8523, and deducting £2325 paid as interest and £1500 carried to the credit of the insurance fund, the sum available for distribution is £22,803. The Directors recommend dividends at the rate of 6 per cent. per annum in the "A" consolidated stock, and of 4½ per cent. per annum on the "B" and "B" additional stocks. These, if approved, will absorb £10,155, and leave £12,648 to be carried forward. The working statements show that 21,774 tons of coal and 822,275 gallons of enriching oils were used in the manufacture of 479,730,000 cubic feet of gas, of which 459,494,000 cubic feet were sold. The following are the estimated quantities of residuals produced: Coke, 13,664 tons; breeze, 3034⅜ chaldrons; tar, 291,365 gallons; and ammoniacal liquor, 6048 butts. The quantity of sulphate of ammonia produced was 155 tons 6 cwt.

PROVINCIAL GAS AND WATER COMPANIES.

Gas.

An All-Round Concession at Bristol.

The Corporation and the gas consumers of Bristol must have alike been gratified at the announcement made by the Chairman of the Bristol Gas Company (Mr. J. W. S. Dix) at the half-yearly meeting on Thursday. In moving the adoption of the report, which showed an increase of upwards of 4 per cent. in the sale of gas in the latter half of last year, compared with the corresponding period of 1902, and a greater demand for stoves and slot meters, he alluded to the time when the price of gas was 2s. 10d. per 1000 cubic feet, and reminded the shareholders that the charge was now 2s. 3d. to general consumers, and 2s. 1d. to the Corporation and to people who consumed upwards of a million cubic feet. Referring to the use of electric lighting, and to the economy resorted to by the city authorities, he remarked that the Company intended to help them. In 1902, they offered to light the city with incandescent lamps at £2 12s. 6d. per annum, and the Corporation accepted the offer, but wanted to strike out certain localities for the electric light. Had they definitely accepted the offer, they would have saved £7000 a year on lighting, together with £3000 on the first installation of the electric light. However, the Directors intended, at the end of the June quarter, to reduce the price of gas to the general consumer to 2s 2d. per 1000 cubic feet, and to 1s. 11d. to the Corporation and to people who used more than half-a-million cubic feet, and also to those who employed gas for power purposes, even if they did not consume so much as this. Mr. Dix also mentioned that a site had been acquired adjoining the Colston Hall for new offices, which the Directors hoped to proceed with shortly. The accounts showed a balance of £55,809 available for distribution; and the Directors recommended a dividend at the rate of 5 per cent. per annum, which was agreed to. After payment of this, there will be a balance of £28,621 to be carried forward.

Moving with the Times at Chester.

The Chester United Gas Company held their 71st half-yearly general meeting on Monday last week, at which accounts were presented showing a divisible balance of £4019 for the six months ending Dec. 31. This enabled the Directors to recommend the payment of the full statutory dividend on the ordinary stock. The Company have modernized their carbonizing plant; and the change has been attended by satisfactory results. Improved prices and working enabled the Directors to write off during the past year £3300 on account of the amount chargeable against revenue in respect of the alterations to the retort-house; and it is hoped to clear off the outstanding balance (about £3300) during the current twelve months. In connection with the extended use of incandescent burners, the Directors have introduced a scheme of complete maintenance at a small quarterly charge; and it has been largely patronized. They have likewise undertaken to supply and fix gas-fires, at an inclusive quarterly rental, on the three-years' hire-purchase system. There is evidently a desire on the part of the Directors and officials to keep abreast of the times in regard to the Company's special branch of commerce, though things in cathedral cities are generally supposed to move very slowly; and they deserve the thanks accorded to them at the close of the meeting.

Good Working at Derby.

It was an unfortunate thing that neither the Chairman (Mr. H. Swingler) nor the Deputy-Chairman (Mr. R. Jefferson) of the Derby Gas Company was able, on account of ill-health, to preside at the annual meeting of shareholders last Friday; but, in their absence, Colonel Gascoyne, who was voted to the chair, had an exceedingly good story to tell of the progress of the undertaking. The total quantity of gas sold in the past year was 554½ million cubic feet, compared with 544½ millions in 1902—an increase of 10 million cubic feet; yet the cost of producing it was £3623 less. This was partly due to a reduction in the price of coal, which cost £30,913, against £33,489—a drop of £2576. The Chairman pointed out that this saving was also largely owing to the energy of the Engineer (Mr. J. Ferguson Bell, Assoc.M Inst.C.E.), in availing himself of all modern improvements in manufacture. During the past year, the Company sold 10 million cubic feet of gas more than in 1902; but in making it there were carbonized 300 tons less coal. The gas made per ton of coal used at both works approaches nearly 11,000 cubic feet for the year, which is the highest make obtained, and has been the means of effecting a large saving in the cost of coals. The Derby Company, like many others, have for many years been troubled with naphthalene. This has had Mr. Bell's special attention for two years; and the Chairman announced that they appeared at last to have overcome the difficulty. The complaints on this score have been brought down to about one per day, on an average; and as there are upwards of 23,000 consumers, this is a very small number indeed. The Chairman thought the question of naphthalene was one which the Institution of Gas Engineers might take up from time to time with benefit to the gas industry; and if they did so, it would, he said, entitle them to the support of both companies and corporations who own gas-works. Reference was made by the Chairman to the installation of the De Brouwer retort-charging machine—the first in England—at the Cavendish Street works; and he stated it had been so successful that the Directors have under consideration the question of erecting similar plant at the Litchurch works. Gas fires and cooking stoves are coming very greatly into favour at Derby; and during the past year the number of these appliances in use was increased to an extent which produced a total meter and stove rental of £3827, or £113 more than in the previous year. The utilization of gas for power by means of gas-engines is considerably on the increase, especially encouraged by the facilities given by the Company to customers desirous of obtaining these motors on the hire-purchase system, and by the low charge made for gas used for this purpose. During last year, 804 new consumers were added; bringing up the total number to 23,262. Turning to the accounts, the Chairman pointed out that the revenue from the sale of gas was £70,417; being an increase of £432. This, however, would have been much more had not the Directors in September reduced the price 2d. per 1000 cubic feet for lighting and 3d. for motive power—making in two years a drop of 5d. for the former and 11d. for the latter purpose. The Chairman said this spoke well for the management and progressive policy of the Company. Dealing with the prices obtained for residuals, he remarked that the receipts from the sale of sulphate of ammonia had gone up from £3146 in 1901 to £4913 last year; being an increase of £1767, or 50 per cent. The total revenue for the year was £96,346, or £2616 more than before; while the expenditure was £68,059, or £1600 less. The profit balance was £28,286, or an increase of £4215. The Directors' report, in which they recommend the declaration of the usual dividends, was adopted. The Chairman subsequently gave a few figures in regard to prepayment meters. He stated that in 1902 the Company sold 48½ million cubic feet of gas, and last year 58½ millions, through these meters; receiving in payment £9722 13s 3d. in pennies—2,333,401 in number, and weighing 21 tons 18 cwt. In the course of the complimentary votes, Mr. Bell said he should like to associate himself with the tribute which had been paid to their Chairman. He (the speaker) perhaps knew more than anyone in the room the great interest Mr. Swingler took in the Company, and what it owed to him—not only to his right judgment and ripe experience, but to his general engineering knowledge. He thanked the Board for the generous appreciation of his services granted at a recent meeting, and assured the proprietors that it would be an incentive to renewed efforts on his part and on that of the staff on behalf of the Company. The Secretary (Mr. Bullivant), who had also been the recipient of special consideration at the hands of the Board, endorsed these remarks.

Water.

Progress of the Colne Valley Water Company.

Addressing the shareholders of the Colne Valley Water Company in the absence of the Chairman at the half-yearly meeting at the Charing Cross Hotel last Tuesday, Mr. C. E. Keyser said he thought, from the figures he should quote, they would see the Company were making steady, though not very rapid, progress. The water-rates had amounted in the half year to £15,625; while in the corresponding period of 1902, they were £14,912, or an increase of about £713. The figures for the first half of the year exhibited an increase, as compared with the same period of 1902, of £1198; so that the total increase for the year was £1911. This was not quite up to the average of the preceding few years; but it might be considered very satisfactory in view of the abnormal character of last summer, when there was almost continuous rain. The water pumped during the half year was 380 million gallons; being an average per head for domestic purposes of just under 24 gallons per day, which was slightly higher than usual. The number of new supplies added during the six months was 348, which were estimated to yield £900 a year; being exactly the same as the amount for the first six months of the year—thus making the total for the twelvemonth £1800. This was the same as in 1899; but rather less than that of the three following years. The amount received for building supplies was also less than the average of the preceding four years, owing to there being a smaller number of houses erected. As to expenditure, nearly every item was either less or about the same, excepting rates and taxes, which continued to advance. The total expenditure was only £197 more than in the corresponding period of 1902, notwithstanding the additional amount of £277 for rates and taxes, which showed they had actually economized to the extent of about £80. The net profit was sufficient to enable the Directors to propose a higher dividend than at the rate of 7½ per cent. per annum; but after careful consideration, it was decided not to propose an increase this time. The Directors were really in a position to pay a dividend at the rate of 8 per cent. They had been steadily raising the dividend by about ½ per cent. at a time; but they had made it a rule only to declare the increased rate after the June half year, which was not quite such a good one as the December half. He therefore hoped that next August they would be in a position to ask the shareholders to agree to the payment of a higher dividend. Capital expenditure had been incurred in laying a 14-inch main to Harrow; and by its means a thoroughly efficient supply would be available for the highest houses in this district. The capital account was now overdrawn to the extent of £786; and it was the intention of the Directors to issue 600 more ordinary shares next month. Mr. A. Helsham-Jones seconded the motion. There was a considerable amount of inquiry respecting the purchase of a small piece of land which the Directors had been advised would be highly serviceable to the Company, and which they had obtained, at a price (£400 per acre) below its valuation, from Mr. S. J. Blackwell, one of the Directors, who had resigned his seat temporarily during the transaction. Full satisfaction was found in the replies as to the value the purchase would be to the Company. Comment was also made as to the increase of the rates and taxes; and the Chairman pointed out that in the King's speech on the opening of Parliament there was something shadowed forth as to the Government taking action on the question of local authorities dealing with the rates in the manner they had been accustomed to do, without apparently any system. The report was unanimously adopted. Dividends at the rates of 7½ per cent. and 7 per cent. on the different classes of shares were declared. Mr. Blackwell was replaced on the Board; and the retiring Directors and Auditor were re-elected. Hearty recognition was made of the services of the Chairman and Directors and officers.

METROPOLITAN WATER ARBITRATION.

(*Before the Right Hon. Sir* EDWARD FRY, *Sir* HUGH OWEN, G.C.B., *and Sir* JOHN WOLFE-BARRY, K.C.B.)

Forty-Eighth Day—Monday, Feb. 8.

Close of the Southwark and Vauxhall Case—Opening of the Chelsea Company's Case.

Mr. BALFOUR BROWNE resumed his speech this morning summing up the case for the Southwark and Vauxhall Company. He said on the last occasion he was discussing certain savings which the Company would make in consequence of the rearrangement of their works. He had dealt with the agreed tables to some extent. So far as the saving in pumping charges was concerned, this was admitted. Counsel proceeded to endeavour to establish a saving of £15,000 mentioned in the tables. The Company had been exceedingly moderate in their claims, and every figure in the £15,000 had been substantiated by the agreed figures, except the rates. With regard to the question of rates, Mr. Moulton admitted that if there was a difference in the two rates in Battersea and Hampton, the Company ought to have credit for it. This amounted to £1460 a year. There was another thing his learned friend had overlooked. The whole of the country, leaving out London—which was excepted—was under the Public Health Act, 1875; and under this Act land covered by water was rated at only one-fourth of its value. Therefore land in Hampton which was covered by reservoirs or filters was rated at one-fourth; but land in Battersea was rated to the full. This, again, made a difference of £1128. He maintained that the income of £104,583 had been established by the figures submitted by the Company. This had not been seriously threatened or criticized by the witnesses on the other side. As to the quality of the Company's water, Mr. Moulton had said he did not assert that the Thames was not a good water. Mr. Restler, the Engineer of the Company, admitted that he had made a mistake on a particular occasion. But because he had made a mistake, was that a reason why they should punish the Company for all time? He objected to the "vamping up" of bacteriology, because they knew that chemical analyses had given exactly the same danger signals for years. He asked the Court to come to the conclusion which they had done in other cases—that the water of the Company was a good one. Coming to the question as to what was the supply per head the Company should give, he did not know why the Board should say 38 gallons. In the East London case, they said 30 gallons; and they had given no reason for the distinction between the two. He touched upon the figures which had been given by Mr. Haward as to the future income of the Company, and said that in his average witness had omitted two of their best sources. Under these circumstances, they had a very strong position even upon Mr. Haward's showing. The Company had turned out to be one of the best and strongest in London, because they had spent an enormous amount of money, their works were up to date, and the shareholders had been content with small dividends. Here was a Company which had been doing its duty well. Their income to-day was over £104,000; and they could certainly justifiably claim that in the future they were entitled to look to a very large increase, because they were before the wants of the times—they had large surplus engine power, and large surplus filtering power. In every way they were provided for the future. From beginning to end his learned friend had not criticized the capitalization of their money; and he asserted that the Company was as well secured as any, that its income was safe, and that, under these circumstances, the highest multiplier they could possibly apply to a water undertaking should be applied to their concern.

This concluded the case; the Arbitrators reserving their award.

The Court then proceeded to deal with the claims of the

Chelsea Company.

The original figure claimed was £4,750,000; the offer of the Board being £1,750,000.

Sir E. CLARKE, K.C., Mr. E. BOYLE, K.C., and Mr. BOYDELL-HOUGHTON appeared for the Company.

Sir E. CLARKE, in opening, said in this case there was no question of the sterilization clause such as had been dealt with in other cases. With regard to the sinking fund, although they desired to maintain the position which they put before the tribunal at an earlier period, and take advantage of the opportunity of discussing that if necessary, at the same time it was not a matter which the Court would now be troubled with very much. It simply affected a sum of £17,000. When he put before the tribunal the figures in respect of the Company's claim in regard to the payment of dividends of over 10 per cent., then it would be seen that the sinking-fund question only affected a very small amount. The Company was established in 1722-3; and from that time they continued to get water from the Thames at Surbiton and Putney Heath up to 1852. Issues of capital were authorized from time to time under different Acts and authorities. In 1852, £300,000 had been raised; by the Act of 1864, £328,750 had been raised—£45,600 ordinary stock, £150,000 5 per cent. preference stock, and £133,150 convertible 4½ per cent. preference stock. There was now £782,322 of ordinary shares, £643 remainder of a sum raised upon debentures and convertible, £150,000 of 5 per cent. preference shares, and £160,000 of 4½ per cent. preference shares; total, £1,092,965. This was the paid-up share capital on Dec. 31 last. The borrowed capital amounted to £249,217. This, added to the £1,092,965, gave a total of £1,342,232, including £50 premium on the 2¾ per cent. debenture stock. Of this, they had £40,000 in hand; and they would give evidence of having surplus lands of a value of some £22,000. Altogether, they had a sum of £60,000 which was available for future capital requirements. Counsel next dealt with the financial history of the Company as shown by the average annual amount appropriated to dividends in a certain series of years, taking five-year periods. In the year ending September, 1903, the net divisible profit was £107,648. A payment had to be made to the Chamberlain for the sinking fund of £2299; giving a residue of £105,349. They calculated on an increase in the current year; and the effect of this would be that during the year to June 30, 1904, they got an income of £108,599—*i.e.*, very near the 10 per cent. up to £1,092,000.

The PRESIDENT: You have never paid a 10 per cent. dividend yet, have you?

Sir E. CLARKE: Yes; we have. We have not paid a sum equal to 10 per cent. on the whole share capital; but we have paid on the ordinary shares a dividend of over 10 per cent.

Counsel next dealt with the right to pay dividends larger than 10 per cent. by reason of certain deficiences. They claimed, in the first instance, the capitalized value of £109,000—the estimated available income on June 30, 1904. Upon the evidence, they were going to ask the tribunal to multiply £109,296 by 36·36 years' purchase. This gave a figure of £3,974,418.

The PRESIDENT: Is your proposition this, that the shareholders between them, whatever may be the nature of their holdings, are entitled to claim 10 per cent. on the whole of the capital?

Sir E. CLARKE said that was so. Proceeding, he remarked that the Act of 1852 provided that the undertaking should be entitled to 10 per cent. upon the paid-up capital. This was £1,092,000; and his contention was that £109,000 was the sum which in the present year could, under that Act, be appropriated to the payment of dividends. But they were not limited to the 10 per cent., because there was another provision—"unless a larger dividend be at any time necessary to make up the deficiency of any previous dividend which may have fallen short." His proposition was that in each year of the existence of the Company since 1852 a sum of 10 per cent. upon the then capital was assigned, which the undertakers were entitled to divide among themselves without reference to the question of what might have been paid in past years or to be paid in future years. The present value, according to their calculations, of the £1,300,000 which they expected to receive during the next 22 or 24 years, and which they would be entitled to appropriate in this way, would be £934,000, subject to the modification that if they were wrong in the argument in respect to the sinking fund, it would be altered by the sum of £17,000—*i.e.*, it would be £917,000 upon the footing of the decision of the tribunal. With regard to their future income, they were going to show that the area with which they were dealing was one which not only assured the income, but, according to all reasonable calculations, would give them a very much larger income in time to come. They submitted that a multiplier of 36·36 was not excessive. The present distribution of water by the Company was something like 12 million gallons a day. They had a right to take 22 million gallons, and a distributing power of 17 millions; but at the present moment they only required to distribute 12 millions. In addition to the figure of £3,974,418 as the capital value of the income of £109,000, they asked to be added the sum of £934,695, representing the capitalized value of the amount required to make up the 10 per cent. upon the paid-up capital of previous years. This made a total of £4,909,113.

Mr. *G. H. Hill*, the Secretary to the Company, examined by Mr] BOYLE, gave particulars of the capital. He then proceeded to give details of the water-rental, domestic and other than domestic supply, new supplies, &c., and put in tables showing a gradual increase from 1894 to 1903. He said they obtained an increase not only from getting new supplies, but from the pulling down of houses and the erection of others of a better character. There was also about 180 acres of land at Fulham not yet built upon. He put in a table showing the dividends paid by the Company since its incorporation in 1723, and giving the annual average for periods of five years. From 1723 to 1732, there was no dividend; but the amount rose from 1733-37 from £320 to £99,187 from 1898-1902.

In cross-examination by Mr. MOULTON, witness said there were no claims whatever against the Company at the present time.

Mr. *Ernest Cooper*, who had investigated the accounts of the Company and had been in communication with the Accountants on the other side and had agreed with them as to certain of the figures, put in abstracts, and explained in detail the methods and bases adopted.

Forty-Ninth Day—Tuesday, Feb. 9.

Mr. *Cooper* was recalled and further examined. The tables put in the previous day showed that the water-rental of the Company rose from £142,824 in 1894 to £177,254 in 1903. The average increase per annum was £3825. The rate paid on the ordinary stock rose from 7⅞ per cent. in 1884 to 11¾ per cent. in 1903. An average number of new supplies of 516 had been laid on in each year from 1899 to 1903 in Fulham; the average estimated annual rental being £851. In other parishes an average of 78 had been laid on, with an average estimated annual rental of £1013; making a total rental of £1864. The effect of an increase of charge for all meter supplies now charged at under 1s. per 1000 gallons to 1s. per 1000 gallons (road watering excepted) would amount to £21,048. The increased receipts for the year to Michaelmas, 1904, were estimated at £5800. The number of supplies had risen from 36,809 in 1894 to 39,516 in 1904; and the net water-rental from £142,824 to £177,254 in the same period. As to back-dividends, the sums required to make up 10 per cent. from 1852 to 1903 amounted to a total of £1,428,688. There had been paid on account since Jan. 5, 1895, £64,564; leaving a total at Sept. 30, 1903, of £1,364,124. Making deductions for subscriptions to charities, 1900 to 1903—£471—left a sum of £1,363,653. According to the witness's table, the estimated value on June 24, 1904, of this sum, rebated at 3 per cent. per annum, was £934,695. The estimated total future capital required to 1925 was £60,200. The total estimated undistributed profits at June 24, 1904, amounted to £42,168; contingency fund balance, £8409; capital balance unexpended at Sept. 30, 1903, £5796, less estimated capital expenditure for the nine months to June 24, 1904, £600, £5196; total, £55,773. The net maintainable profit for the year 1903, before allowing for payment to the Chamberlain's fund, was £107,647. Assuming that the contribution to the Chamberlain's fund had to be taken into consideration, the estimated value on June 24, 1904, of £1,363,653 was £917,781. The total increase of capital from March 31, 1880, to Oct. 1, 1903, was £267,613.

In cross-examination by Mr. MOULTON, witness said his estimate with regard to back-dividends depended upon the estimate of future income; and he had obtained the present value by discounting at 3 per cent. The sums discounted were the balances each year after paying debenture stock and maximum dividends He estimated the total increase of the gross water-rental for 1904-5 at £10,550.

Mr. *A. A. Gill*, the Chief Engineer of the Company, in answer to Mr. BOYLE, described the Company's works in brief; the President observing that there was no dispute with regard to capacity. As to the quality of the water, witness said the monthly reports of the Government Analyst for the past ten years showed a degree of purification considerably in advance of any of the other four Companies drawing their supply exclusively from the Thames. To provide for a daily average consumption of 13,475,000 gallons, certain extensions would be necessary from 1906 to 1909; the total estimated cost being £122,000. Witness then put in tables showing that in 1880 the average number of houses supplied, according to the Water Examiner's report, was 30,133, rising to 39,563 in 1903. The average population, according to the same report (7·36 per supply), rose from 234,527 in 1881 to 291,187 in 1903; and the average daily supply from 8,892,067 gallons in 1883 to 11,894,466 gallons in 1903. In the latter period, the number of gallons per head rose from 36·56 to 40·84. According to the Company's estimates, the average population on the basis of the 1901 census (7·86 per supply) rose from 236,846 in 1880 to 310,965 in 1903, and the average daily supply from 7,860,168 gallons in 1882 to 11,894,466 gallons in 1903. The number of gallons per head rose from 31·7 in 1882 to 38·2 in 1903. The average number of supplies rose from 36,809 in 1894 to 39,516 in 1903. The estimate of future supplies rose from 39,816 in 1904 to 42,516 in 1913, after which no increase was anticipated.

Mr. *R. E. Middleton* said that the capital sum of £60,200 estimated to be payable by the Company before 1925 was intended to be provided (*a*) from the capital sum of £5796 in hand, (*b*) by sale of land £22,000, (*c*) by cash on deposit £39,367, and (*d*) contingency fund £8409. The average supply of water afforded by the Company during 1903 was at the rate of 11,861,000 gallons a day. The rate of increase in the quantity of water taken was, for the quinquennium from 1893 to 1898, 16·004 per cent., and from 1898 to 1903 8·455 per cent. To be on the safe side, he had considered that 13,700,0 0 gallons of water per diem on the average would be required, with a possible supply of 16,700,000 during the maximum month. Even if so large an allowance as 39 gallons per head per diem were made, the average supply would not exceed 13,689,000 gallons. Under more stringent regulations than those at present in force, the supply for domestic purposes should not exceed 20 gallons per head, to which must be added a meter supply of about 14 gallons, or 34 gallons in all. At this rate, the required supply would be 11,934,000 gallons a day; and the estimate given of 13,700,000 gallons was shown to be a very ample one. Notwithstanding the fact that the Company's district was nearly filled up, there was still a great future before it. The receipts per supply in 1883 were £3221; in 1893, £3864; and in 1903, £4486. If continued at the same rate of 16·10 per cent. per decennium, the receipts per supply would be £5208 in 1913, and £6047 in 1923. The net water-rental derivable from 43,515 supplies at £6047 per supply would be £263,135. The average supply of water to be afforded in 1923 being taken at 13,700,000 gallons a day, and during the maximum month possibly 16,700,000, there was an ample margin, as the Company were entitled to draw 22 million gallons a day from the Thames without restriction. The distributing mains were sufficient for present requirements; but it was considered necessary to provide for laying a length of 24-inch main from the service reservoirs to Putney Bridge in 1909. The ratio of expenses to the net water-rental was almost exactly 35 per cent.; and it was believed that this was an ample provision for the future. The net water-rental had increased at an average rate of 2·337 per cent. in the quinquennium 1893-8, and at 2·228 per cent. in 1898 to 1903.

Mr. *Henry Rofe* corroborated the evidence given by the previous witnesses.

Sir EDWARD CLARKE intimated that Sir William Crookes and Professor Dewar were present and could give evidence as to quality.

Mr. MOULTON said he did not contest the quality.

Mr. *G. R. Strachan* said the works were of extreme simplicity. He considered that in 1923, 13,250,000 gallons would represent the average daily supply, and about 16½ million gallons the maximum. There had been an extraordinary increase in the value per supply.

Mr. *A. R. Stenning* said there were very special characteristics about the rateable value of the area of supply. In one part, the water-rate on the old buildings was £140, and on the new buildings it had increased to £840. The probable increase in the whole of the Company's area in the near future was £166,500.

Fiftieth Day—Thursday, Feb. 11.

Mr. *Stenning*, in cross-examination by Mr. MOULTON, stated that there were about 180 acres to be built on in Fulham. Witness also said that there were large and profitable areas yet to be built on in Westminster. He had investigated how much the City of Westminster had been going up in rateable value during the last three years. The only figure he had been able to obtain was the rateable value of St. George's in certain years—1896 and 1900. In the latter year, it was £3,179,000. He thought that in the future there would be a more rapid increase in the value.

Witness was re-examined as to the estimated increase of rateable value in Kensington, St. George's, Chelsea, and Fulham; and he said that Fulham showed the largest increase of all. The annual average increase in these four districts in recent years at certain periods showed figures of £107,000, £168,000, and £185,000. The rateable value in the future would increase more rapidly than in the past, owing to the fact that what was going to be done now concerned habitable houses.

Sir *John Hollams*, Solicitor to the Company, gave evidence concerning the expenses of liquidation. He said the winding-up of a Parliamentary Company was more difficult than that of a Joint-Stock Company. The expense of winding-up the latter was very trifling unless they had disputes.

Replying to Mr. FITZGERALD, witness said he took it that a good many officials would not go over to the Water Board. They were compensated to a certain extent; but in all fairness these gentlemen ought not to be losers by the loss of their offices.

Mr. *E. C. Bourchier*, Architect and Surveyor to the Cadogan and Hans Place Estate, No. 3, said that when the estate was completed the estimated gross rental would be £184,157.

Mr. *Gill*, recalled, said the total estimated rateable value was £123,559, and the estimated water-rental £5731.

Mr. MOULTON then submitted legal arguments respecting the share capital of the Company, and the construction of the Acts bearing upon the subject.

Sir. E. CLARKE replied upon the points raised.

The PRESIDENT, in delivering the judgment of the Court, said: The question which we have now to decide is one which arises under these circumstances. We have before us a Company with a total share capital of £1,092,965. This consists of a sum of £782,322 ordinary stock, and of three other amounts—one of £150,000 5 per cent. preference stock, another of £643 4½ per cent. preference stock, and a larger sum of £160,000 of preference stock at the same rate. The Act of 1852, which authorized the Company to issue certain capital, incorporated with it the Water-Works Clauses Act of 1847, and that Act has a heading to a series of clauses, which is this: "With respect to the amount of profit to be received by the undertakers when the water-works are carried on for their benefit, be it enacted as follows"—I pause to observe that what is dealt with is not a dividend on shares, but an amount of profit to be received by the undertakers. We have two things, one set against another—the total amount of profits, and the undertakers as a whole. Then the first clause that follows the heading is this: "The profits of the undertaking to be divided among the undertakers in any year shall not exceed the prescribed rate, or, where no rate is prescribed, they shall not exceed the rate of £10 in the £100 by the year on the paid-up capital in the undertaking, which in such case shall be deemed the prescribed rate, unless a larger dividend be at any time necessary to make up the deficiency of any previous dividend which shall have fallen short of the said yearly rate." On this section, it appears to me that two important questions arise for our determination. The first is, What is the meaning of "the paid-up capital in the undertaking?" I confess I entertain very little doubt—no doubt in my own mind—that it means the whole sum of £1,092,965. It is not the ordinary share capital of the undertaking, it is the paid-up capital of the Company; and it deals with that. Now, if nothing else occurred, it would appear to me that the rights of the shareholders would be these: In no case could the profits to be divided ever go beyond 10 per cent. on the total ordinary and preference capital of the Company; but when you come to divide this, you would divide it in the following way: Preference shareholders would be entitled to their preferential dividends; and the whole residue of net profits, after payment of these, would be divisible among the ordinary shareholders, and their right to dividend would be their aliquot portion of this surplus revenue after paying the preferential dividend. Any deficiency in the dividend would be the difference between what they actually received and what they would have been entitled to receive by a division of the entire surplus profit. This would be my reading of the clause. I am quite unable to follow the argument that "dividend" means a fixed rate of dividend; and it seems to me, on this part of the case, that Mr. Moulton's argument assumed that 10 per cent. was the fixed rate, and that you must not go beyond this. Their right to dividend, I repeat, was, in my opinion, their right to their share—the right to dividend vested in each ordinary shareholder was his right to receive his aliquot portion of the profits of the undertaking not exceeding 10 per cent. of the whole paid-up capital which is not appropriated to the preference shareholders. Then comes the other question, which is a very different one—viz., Has there in this case been a prescription of a rate as to the whole or any other part of the capital of the Company? Now section 2 of this same Act of 1847 shows that by the words "prescribed rate" is meant a rate prescribed by statute. Therefore, we have to consider whether any rate has been prescribed by statute. Now, as to the preference stock. In the case of the two Acts which authorized the issue of this preference stock, there was incorporated the portion of the Companies Clauses Act of 1863 which deals with the subject of preference shares or stock. Section 13 of this Act provides that "where any such Company is authorized by any Special Act hereafter passed and incorporating this part of this Act, to raise any additional sum or sums by the issue of new preference shares, or by the issue of new preference stock, or (at the option of the Company) by either of those modes," then certain things shall happen. I repeat, in both the Acts of 1864 and 1875 these powers are given—powers to issue either as ordinary or preference, or partly as ordinary and partly as preference. Therefore the contingency contemplated by this section has arisen; and the Company is invested with these powers. When this is the case, "then, and in every such case, the Company may, for the purpose of raising such additional sum or sums from time to time, create and issue such new shares or new stock, either ordinary or preference, and either of one class and with like privileges or of several classes and with different privileges, and of the same or different amounts"—then, with various kinds of dividends, fluctuating, contingent, and so forth—"or other dividend or interest not exceeding the rate prescribed in the Special Act." Now, in the present case, in neither of these two Acts is any special rate prescribed; but it goes on "and if no rate is prescribed, then not exceeding the rate of £5 per cent. per annum." Now it appears to me, and my colleagues also, that this is a prescription—it is a prescription by statute, it is a limitation by statue of the right to receive more than 5 per cent. or such lesser sum as the Company might determine. With regard to the 5 per cent. preference stock, therefore, we hold clearly that this clause applies, and that no more than 5 per cent. can be deemed to be the prescribed amount. With regard to the 4½ per cent. stock, the question is not quite so clear—it is a little different. But in our judgment, the same conclusion must be arrived at; and for this reason, that what is prescribed is a rate not exceeding 5 per cent. per annum. This seems to delegate to the Company the right of prescribing something less than 5 per cent. Therefore we think that the 4½ per cent. must be taken as

the amount, and that therefore there is a right to receive only 10 per cent. on the ordinary capital and 5 and 4½ per cent. respectively on the two classes of preferential capital.

Mr. MOULTON, in opening the case for the Water Board, said he proposed to call evidence to the effect that the Court would be treating the Company fairly if they supposed that what they had earned in the past would continue in the future.

Mr. *Pilditch* gave evidence to the effect that the district of supply of the Company had been mostly covered with buildings. The uncovered portion, 180 acres at Fulham, represented a very small proportion of the uncovered area twenty years ago.

In cross-examination by Sir E. CLARKE, witness said the increase in the rateable value in Westminster had, he agreed, been unequally distributed. The rateable value of Westminster for the last four years showed an increase of under 1 per cent. He thought the Company would lose in water-rental, because they were going to remove a large number of ratepaying premises.

Mr. *S. C. Gillings*, Mr. *C. F. Slater*, and Sir *A. Binnie* also gave evidence. The last-named, in reply to Mr. FITZGERALD in cross-examination, said the probable capital expenditure of the Company during the next thirty or forty years would be about £7000 a year. He had arrived at the conclusion that it would increase in future years.

The Court adjourned until yesterday.

GAS PROFITS AND SLOT METERS AT WARRINGTON.

The minutes of the Warrington Gas Committee which were brought up at the last monthly meeting of the Town Council, stated that letters had been received from Mr. Wilson and the Trades and Labour Council asking the Committee to take into consideration the question of a reduction in the price of gas to prepayment consumers. The following report by the Engineer (Mr. W. S. Haddock) on the subject was also submitted: The total number of slot meters in use on March 31 last was 5574. Taking the average consumption of gas through these meters for lighting purposes at 6000 cubic feet per annum, the following figures give the receipts and expenditure per slot meter supplied: Receipts: Extra cash received over and above the 2s. 6d. net per 1000 cubic feet charged to ordinary consumers on sale of 6000 cubic feet of gas at 10d. per 1000—total, 5s. Expenditure: Loss of meter-rent, 1s. 6d.; say, 10 per cent. on 16s. extra cost of slot meter over others, 1s. 7d.; shorter life of slot meter as compared with others, say, 5 per cent. on 44s., 2s. 2d.; extra cost of collecting, 1d.—total, 5s. 4d. Showing a net loss of 4d. where the consumer burns 6000 cubic feet per annum, and a corresponding greater loss where a less quantity of gas is consumed. The figures given above for extra cost and less life of meter owing to the great strain set up in the coin-mechanism, were under-estimated on the earlier form of meter. As we gained experience in the working of these meters, improvements have been made; and the newer form is now lowering these costs. A large number of the slot-meter consumers use the cooker which is supplied free of charge by the department. This raises the average consumption to 8200 cubic feet per meter. The extra amount thus received does not more than cover the repairs and maintenance.

The adoption of the minutes having been moved, Mr. Wilson asked if they were to understand from the report that the Corporation lost £92 18s. every year through the use of slot meters? He was not satisfied with the report, and thought some further action should be taken. Mr. Stott said he had always been under the impression that the Gas Committee encouraged the use of slot meters, so that poor people could have gas instead of dangerous low-flash oil in paraffin lamps; but it seemed now that they were not trying to encourage the poor to use gas, seeing that they were charging them 7d. per 1000 cubic feet more than they were the other consumers, who could afford to pay their bills half yearly. He did not think any profit whatever should be made upon gas. The profits so made went to the relief of the rates and benefited many large ratepayers who did not pay for gas at all, preferring to generate their own electricity. This meant that in paying a high price for their gas, the consumers were doing something which benefited non-consumers. From the report, it would appear that the Gas Committee were not going to make any alteration; and this being the case, it would be his duty at some future date to move that the price of gas be reduced. He thought it ought to be lower, as it was very unjust to rob—he could use no better term—a certain section of ratepayers to relieve the rates of others. The Mayor, however, pointed out that Mr. Stott was not in order in discussing the price of gas. The report did not state that the Committee were going to allow the charges to remain as they were; and the Committee were prepared to do anything they could for the benefit of the prepayment consumers. They were now actually getting their gas cheaper than others, as they obtained it below cost price. In answer to other members, he said the Committee were still considering the question. Mr. Evans remarked that the cost of the prepayment meters was a big consideration; and it was absolutely impossible to let these consumers have gas for less than they were charged at present. The Deputy-Mayor also said the slot-meter users were getting both fair play and fair value. It was no benefit to the Committee for these meters to be used. Further, they were constantly having them smashed open and robbed; and they had borrowed £7000 or £8000 which they had had to pay for the meters.

The minutes were then approved.

At the monthly meeting of the Southport Town Council last Thursday, the minutes of the Gas Committee contained a recommendation that Mr. John Booth, the retiring Gas Engineer, should be granted an allowance of £125 per annum. They were presented by the Chairman of the Committee (Mr. E. Trounson), who moved their adoption with the exception of the paragraph referring to the above matter. This was agreed to without comment.

GAS AND WATER COMPANIES' STOCK AND SHARE LIST.

Referred to on p. 396.

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.	GAS COMPANIES.			£ s. d.
590,000	10	Oct. 15	10½	Alliance & Dublin 10 p.c.	19—20	+½	5 5 0
100,000	10	"	7½	Do. 7 p.c.	13—14	..	5 7 2
200,000	5	Nov. 12	6½	Bombay, Ltd.	5½—6	..	5 8 4
140,000	5	"	6½	Do. New, £4 paid	4—4½	..	5 15 7
380,000	Stk.	Aug. 13	12	Brentford Consolidated	228—233	..	5 3 0
300,000	"	"	9	Do. New	171—176	..	5 2 3
50,000	"	"	5	Do. 5 p.c. Pref.	130—135	..	3 14 1
206,250	"	Dec. 11	4	Do. 4 p.c. Deb.	103—108	..	3 14 1
220,000	Stk.	Sept. 11	10½	Brighton & Hove Orig.	207—212	..	5 1 5
246,320	"	"	7½	Do. A. Ord. Stk.	145—150	..	5 3 4
460,000	20	Oct. 15	10	British	37⅞—38½	−1	5 3 11
100,000	Stk.	Aug. 13	6	Bromley, Ord. 5 p.c.	115—120	..	5 0 0
165,700	"	"	4½	Do. do. 3½ p.c.	88—93	..	4 16 9
500,000	10	Oct. 15	7	Buenos Ayres (New) Ltd	10⅞—11	..	6 7 3
250,000	Stk.	Dec. 30	4	Do. 4 p.c. Deb.	91—93	..	4 6 0
150,000	20	July 10	8½	Cagliari, Ltd.	22—24	..	6 17 6
100,000	10	June 11	10	Cape Town & Dis., Ltd.	14—15	..	6 13 4
50,000	50	Nov. 3	6	Do. 6 p.c. 1st Mort.	52—54	..	5 11 1
1,375,000	Stk.	Aug. 27	5⅝	Commercial 4 p.c. Stk.	104—107	..	4 17 3
503,750	"	"	5	Do. 3½ p.c. do.	99—102	..	4 18 0
442,947	"	Dec. 11	3	Do. 3 p.c. Deb. do.	84—87	..	3 9 0
800,000	Stk.	Dec. 30	7	Continental Union, Ltd.	110—115	..	6 1 9
200,000	"	"	7	Do. 7 p.c. Pref.	130—135	..	5 3 8
575,000	Stk.	Aug. 27	5½	Crystal Palace Ord. 5 p.c.	110—115	..	4 12 9
60,000	"	"	5	Do. 5 p.c. Pref.	118—123	..	4 1 4
112,533	"	Jan. 14	5	Do. 5 p.c. Deb. Stk.	134—137	..	3 13 10
486,090	10	Jan. 28	10½	European, Ltd.	18—19	..	5 10 6
354,060	10	"	10½	Do. £7 10s. paid	13—14	..	5 12 6
15,243,200	Stk.	Feb. 11	4½	Gaslight and Coke — 4 p.c. Ord.	86—88*	−½	5 0 0
2,600,000	"	"	3½	Gaslight and Coke — 3½ p.c. max.	87—89*	+½	3 18 8
3,799,735	"	"	4	Gaslight and Coke — 4 p.c. Con. Pref.	105—108*	..	3 14 1
4,193,975	"	Dec. 11	3	Gaslight and Coke — 3 p.c. Con. Deb.	85—87	..	3 9 0
258,740	Stk.	Sept. 11	5	Hastings & St. L. 3½ p.c.	90—95	..	5 5 3
70,000	10	Oct. 15	11	Hongkong & China, Ltd.	16—17	..	6 9 5
3,800,000	Stk.	Nov. 12	10	Imperial Continental	193—196	−4	5 2 0
473,600	Stk.	Feb. 11	3½	Do. 3½ p.c. Deb. Red.	97—99*	+½	3 10 8
165,242	Stk.	Aug. 27	6	Lea Bridge Ord. 5 p.c.	105—110	−8	5 9 1
561,000	Stk.	"	10	Liverpool United A	214—216	..	4 12 7
718,100	"	"	7	Do. do. B	162—164	..	4 5 4
306,083	"	Dec. 30	4	Do. do. Deb. Stk.	108—110	..	3 12 9
75,000	5	Dec. 11	5	Malta & Medn., Ltd.	4¼—4⅝	..	5 5 3
560,000	100	Oct. 1	5	Met. of 5 p.c. Deb.	101—105	..	4 15 3
250,000	100	"	4½	Melbourne 4½ p.c. Deb.	100—102	..	4 8 3
541,920	20	Nov. 12	3½	Monte Video, Ltd.	9—10	..	7 0 0
1,515,892	Stk.	Aug. 13	4½	Newc'tle & G'tesh'd Con.	107—109	+2	4 2 7
406,025	Stk.	Dec. 31	3½	Do. 3½ p.c. Deb.	94—95	..	3 13 8
300,000	Stk.	Nov. 26	8	Oriental, Ltd.	135—140	..	5 14 4
600,000	5	Sept. 30	7	Ottoman, Ltd.	5—6	..	5 16 8
					Ex div. *		

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.	GAS COMPANIES.			£ s. d.
205,005	Stk.	Jan. 14	6½	Ply'mth & St'house 5 p.c	121—126	..	4 17 2
851,070	10	Oct. 15	7	River Plate Ord.	11—11½	..	6 1 9
300,000	Stk.	Dec. 30	4	Do. 4 p.c. Deb.	92—94	..	4 5 1
250,000	10	Sept. 30	8	San Paulo, Ltd.	10¾—11½	..	6 19 2
135,000	Stk.	Sept. 11	10	Sheffield A	240—242	..	4 2 8
209,984	"	"	10	Do. B	240—242	..	4 2 8
523,498	"	"	10	Do. C	238—241	..	4 3 0
116,106	Stk.	Sept. 30	5	Shrewsbury Ord. 5 p.c.	109—112	..	4 9 3
6,150,000	Stk.	Feb. 11	5⅓	South Met., 4 p.c. Ord.	116—119*	+½	4 9 6
1,832,700	"	Jan. 14	3	Do. 3 p.c. Deb.	84—87	..	3 9 0
380,940	Stk.	Nov. 12	5	Southampton Ord.	105—110	..	4 10 11
87,950	"	Jan. 14	4	Do. 4 p.c. Deb.	100—103	..	3 17 8
120,000	Stk.	Aug 27	6	Tottenham and Edmonton — A. 5 p.c.	115—120	..	5 0 0
313,020	"	"	4½	Tottenham and Edmonton — B. 3½ p.c.	95—100	..	4 10 0
182,380	10	Dec. 30	8	Tuscan, Ltd.	8—9	..	8 17 10
149,900	10	Jan. 2	5	Do. 5 p.c. Deb. Red.	97—99	..	5 1 0
737,142	Stk.	Aug. 13	5	West Ham, 5 p.c. Ord.	96—99	..	5 1 0
				WATER COMPANIES.			
781,517	Stk.	Dec. 30	12	Chelsea, Ord.	320—325	..	3 13 10
150,000	"	"	5	Do. 5 p.c. Pref.	∂142—147	..	3 8 0
160,000	"	"	4½	Do. 4½ p.c. Pref. '75	132—137	..	3 5 8
175,785	"	Sept. 30	4½	Do. 4½ p.c. Deb.	132—137	..	3 5 8
1,720,560	Stk.	Oct. 15	8	East London, Ord.	220—225	..	3 11 1
654,740	"	Dec. 11	4½	Do. 4½ p.c. Deb.	133—138	..	3 5 3
1,282,943	"	"	3	Do. 3 p.c. Deb.	87—90	..	3 6 8
700,000	50	Dec. 11	10	Grand Junction — 10 p.c. max.	135—138	..	3 12 6
310,000	Stk.	Sept. 30	4	Grand Junction — 4 p.c. Deb.	115—120	..	3 6 8
708,000	Stk.	Aug. 13	10	Kent	290—300	..	3 6 8
160,000	"	"	7	Do. New, 7 p.c. max.	195—205	..	3 8 4
1,043,800	100	Dec. 30	11	Lambeth, 10 p.c. max.	290—300	..	3 13 4
406,200	100	"	8½	Do. 7½ p.c. max.	215—225	..	3 15 7
350,000	Stk.	Sept. 30	4	Do. 4 p.c. Deb.	115—120	..	3 6 8
500,000	100	Aug. 13	12½	New River, New Shares	325—335	..	3 16 5
1,000,000	Stk.	Jan. 28	4	Do. 4 p.c. Deb.	116—119	..	3 7 3
902,300	Stk.	Dec. 30	7½	South-wark and Vauxhall — Ord.	270—280	+10	2 13 7
126,500	100	"	7½	South-wark and Vauxhall — 7½ p.c. max.	220—230	..	3 5 3
489,200	Stk.	"	5	South-wark and Vauxhall — 5 p.c. Pref.	142—147	..	3 8 0
1,019,585	"	Oct. 15	4	South-wark and Vauxhall — 4 p.c. A Deb.	115—120	..	3 6 8
1,155,066	Stk.	Dec. 11	10	West Middlesex	290—295	..	3 7 9
200,000	"	"	4½	Do. 4½ p.c. Deb.	130—135	..	3 6 8
200,000	"	Sept. 11	3	Do 3 p.c. Deb.	88—91	..	3 5 11
					* Ex div.		

PUBLIC LIGHTING OF WINDSOR.

Council Decide on Electricity—Ratepayers Favour Gas.

The question of the public lighting of Windsor, which was last month considered at length by the Town Council (*ante*, pp. 161, 223), came up again for discussion on Thursday. On the first occasion the Lighting Committee recommended the acceptance of the tender of the Electrical Installation Company for the lighting of the town during the next five years; but the matter was referred back to them to arrange a more equable distribution of illumination for both gas and electricity.

At the meeting of the Council last week, the Committee submitted the following report: "The question referred back to your Committee as to obtaining more equal distribution of public lights in side streets has been fully discussed; and after having inspected lights erected by the Gas Company and the Electric Light Company, they recommend that the tender of the Windsor Electrical Installation Company be accepted for five years, determinable by the Corporation at the end of the first two years, on six months' notice in writing so to do. The tender recommended for acceptance is for 10 2000-candle power lamps, 21 500-candle power lamps, and 260 twin 16-candle power lamps, giving 32-candle power combined, at an annual cost of £1375." Alderman Brown, in moving the adoption of the report, said the matter had given the Lighting Committee a great deal of difficulty. The reason for the two years' limit was that they did not know what improvements might be made, and therefore they wanted power to terminate the contract. A letter was read from the Ratepayers' Association conveying a resolution passed at a public meeting in favour of adopting the Gas Company's tender; and Mr. Bressey (who now supported the Committee's recommendation, though on the previous occasion he had spoken in favour of gas) said he was sorry the ratepayers had not taken the matter up earlier, and that the letter from the Association had come so late. He thought the solution of the difficulty was in what had been arrived at by the Committee—that the contract should be, at the will of the Council, terminable at the end of two years, during which time there might be improved methods, and the Electric Lighting Company would be able to establish their character, while the Gas Company would also be able to improve their methods. In this way there would be a friendly rivalry between the two, resulting in the best method of lighting at the most reasonable cost. Alderman Bampfylde, referring to the ratepayers' meeting, said he was bound to admit the feeling was decidedly in favour of gas. He hoped the Counccil would take steps to test the power of the electric lights from time to time, as it was common knowledge that there had been many complaints.

The Committee's report was adopted *nem. con.*

The ratepayers' meeting which was referred to in the Council was held earlier in the week, and about 200 persons attended. The feeling of those present is clearly indicated by the following resolution, which (with a rider that it be sent to the Corporation, with a request that it be acted upon) was carried with only two dissentients: "That this meeting is strongly of opinion that the Gas Company's tender for public lighting is the most economical and efficient, and will serve the best interests of the ratepayers, and respectfully urges the Council to adopt the same."

Mr. E. Bragg, who presided, said the electric lighting contract which expired next month had been in existence for five years; and he asked if it had been satisfactory and equally divided. Why should Thames Street have 20,000-candle power out of a total of 38,000-candle power, thus monopolizing more than half? The lighting area of the town was 13 miles, and Thames Street and High Street were only about half-a-mile; and there were ten lights of 2000-candle power each. The lighting rate was 5d. in the pound; and the residential people had to pay equally the same as in Thames Street and High Street. The rateable value of Peascod Street was quite equal to that of High Street and Thames Street. Was it because there were so many of the Councillors residing in Thames Street that they desired the electric light? If the gas tender had been adopted, a saving would have been effected of £250 a year, or a penny rate; the cost per annum being 4d. in the pound instead of 5d. They were not likely to have a better light by continuing electricity; and as to the bogey about breaking up the footpaths, they had to be replaced to the satisfaction of the Surveyor. Mr. J. T. King, the Hon. Secretary of the Ratepayers' Association, said the present cost was not economical, nor was the light efficient. The Gas Company's scheme was a better one; and in fixing their price they had acted very generously. Mr. Stoneham remarked that the light in the side streets had been another word for darkness; and the Electricity Company had not been able to satisfy their private consumers. He instanced several of the latter who had reverted to gas. Among the other speakers was Mr. Suckling, who asserted that, with regard to the Electric Light Company, there had been favouritism from beginning to end. He, however, also took the opportunity to complain of the quality of the gas, which he described as "inferior."

THE MARYLEBONE ELECTRIC LIGHTING QUESTION.

The poll of the ratepayers of Marylebone on the subject of the promotion of a Bill by the Borough Council to enable them to raise money for the purchase of the portion of the undertaking of the Metropolitan Electric Supply Company, Limited, situated in the borough, took place on Monday last week. The result was as follows: In favour of the Bill, 3779; against it, 2603—majority in favour, 1176. As there are about 21,000 names on the Register of Electors, it will be seen that less than one-third voted. The announcement of the numbers by the Mayor (Rev. H. Russell Wakefield) at the Town Hall, shortly after ten o'clock

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at night, was greeted with loud cheers by the majority of the members of the Corporation who had assembled in the Council Chamber. A special meeting of the Council was held on Thursday evening for formally sanctioning the promotion of the Bill. The Mayor having moved the necessary resolution, Mr. Elgood suggested that an opportunity should be given to discuss the various clauses. Mr. Debenham, the Chairman of the Electric Supply Committee, said he was advised by the Parliamentary Agents that the resolution should be agreed to as it stood. They would need an absolute majority of the Council for the purpose of passing the resolution. The Mayor said they might agree to the resolution, and he did not see why afterwards they should not have a discussion on the clauses. Mr. Debenham said any clause might be altered if it did not interfere with the spirit of the Bill. Sir T. Brooke-Hitching complained of the Council being bound to a measure which had not been properly discussed; and he said the Bill would certainly be opposed both in the House and in Committee. Eventually the motion was carried with four dissentients. Mr. Debenham then informed the Council that he had received a communication from the Clerk to the London County Council to the effect that they felt obliged to deposit a petition against the Bill, in order to safeguard their position; but they hoped it might be possible to adjust any amendments they considered necessary, and when the time arrived he would be pleased to discuss with Mr. Debenham any points he might desire.

COVENTRY WATER SUPPLY.

The Coventry Town Council have been for some time considering the question of obtaining an increased supply of water to meet the growing requirements of the city, including those portions of the parishes of Foleshill and Stoke which they recently took over from the North Warwickshire Water Company. Since the supply in these districts has been furnished from the Corporation mains, great complaints have been made of the want of pressure; and the inhabitants appear to be anything but contented with the supply under the new *régime*. Mr. Charles Hawksley, M.Inst.C.E., has therefore been consulted by the Corporation as to the best means of increasing the present supply; and his report is anxiously awaited. Meantime, a solution of the difficulty may possibly be found in the fact given in evidence at the Local Government Board inquiry on the proposed Foleshill drainage scheme, held on the 2nd inst., by Mr. Joseph Quick, M.Inst.C.E., that the yield of water from the new well sunk by the North Warwickshire Water Company at Keresley is so abundant as to furnish an ample supply of excellent water, not only for the wants of their own district, but also for the supply in bulk to Coventry of any additional quantity necessary for their present and future requirements. In view of the great importance of the question, the matter will doubtless have the fullest consideration and be thoroughly investigated by the Water Committee of the Corporation before any final decision is arrived at.

HULL CORPORATION WATER SUPPLY.

The Gas and Water Engineer of the Hull Corporation (Mr. F. J. Bancroft, B.Sc., Assoc.M.Inst.C.E.) has just issued his seventh annual report on the water undertaking of the Corporation. Beginning with rainfall, he states that at Hull last year it was 9 per cent. above the average of 30 years, which was much lower than that of many other places in the United Kingdom. The yield of water from the wells was 3,330,828,000 gallons, compared with 3,352,207,000 gallons in 1902, and 3,377,259,000 gallons in 1901. There are two pumping-stations, at Springhead and Cottingham; the former yielding 1,605,071,000 gallons, and the latter 1,725,757,000 gallons of the total bulk. The greatest quantity of water pumped in one day was 6,337,000 gallons, on the 26th of December, at Springhead; but 5,491,000 gallons were delivered from Cottingham on the 2nd of July. The population supplied is 254,000, of whom 249,600 are within and 4400 beyond the city boundary. During last year, 14,083 yards, or about eight miles, of new mains were laid; but 2393 yards were taken up—making a net increase of 11,690 yards. The total length of mains in use on Dec. 31 was 407,068 yards, or 231·28 miles. The daily supply per head of the population last year was 35·75 gallons; but the supply for domestic purposes only was 27·43 gallons.

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

Gas affairs bulked largely at the meeting of the Broughty Ferry Corporation last Monday—that body being still, or again, at sixes and sevens as to their duties in reference to the gas undertaking. The first item which came forward was a trifling one; but it served the purpose of the straw which shows in what direction the wind is blowing. Mr. Westwood, who erstwhile was a very active volcanic force in the Town Council when gas matters were under consideration, objected to a minute by the Gas Sub-Committee, which stated that "the ordinary monthly accounts were submitted and examined, and ordered to be passed for payment." He contended that it was the function only of the Finance Committee to pass accounts. The Town Clerk, however, agreed to substitute the word "recommended" for "ordered," and this satisfied Mr. Westwood. The next item was the report by the Manager—Mr. G. Keillor, jun.—upon proposed alterations and additions at the gas-works. Mr. Keillor proceeded upon the assumption that the works are much too small. He proposes an outlay of £3995; the principal items being: Reconstructing coal-hopper on ground floor, fixing therein a coal breaker and conveyor, supplying and fixing a complete set of overhead coal-storage hoppers, and supplying and fixing mechanical coal-fillers, £850; extending retort-bench by the erection of two new ovens and

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fittings, £750; and new washing and scrubbing apparatus, £875. Mr. Crystal, the Convener of the Gas Committee, said the result of the Manager's report was to put the responsibility of maintaining the gas-works in an efficient state upon the Council; and the Gas Committee thought that the best plan would be to consult Mr. Herring, of Edinburgh, before coming to a finding on the report. He moved that Mr. Herring be consulted. Mr. Sim moved that the Manager be thanked for his report, and that it be allowed to lie on the table. He thought that, in view of the large deficit in their gas account, the first thing they should aim at was to "mark time" till the deficit was liquidated, and not to take any action meantime further than to maintain the works in a sufficient condition. In two or three years they would require to erect a new gasholder, at a cost of £8000 or £10,000, and their borrowing powers would again be exhausted. Mr. Ireland pointed out that it would require an additional 9d. per 1000 cubic feet upon the price of gas to meet the deficiency in the accounts; and he thought it would be folly to go on with these works. Mr. Westwood recalled that in a recent report the Manager had stated that things were going very smoothly at the gas-works; and therefore he was against their spending money upon obtaining an expert's opinion. Mr. Sim essayed to speak again, in spite of his being called to order by Provost Gray. The Council, by eight votes to three—the minority being Messrs. Sim, Westwood, and Ireland—resolved to obtain a report from Mr. Herring on the subject. Then Mr. Westwood submitted a motion, of which he had given notice, to the effect that the Council proceed to use money which they obtained power to borrow in 1903, for the purpose it was principally obtained for—viz., the erection of a new gasholder. He moved the motion, he said, with a feeling of depression, because he knew it would not be carried. Mr. Crystal moved that a new gasholder be not erected. Mr. Westwood's motion was defeated by nine votes to two.

The following statement appeared in the "Dundee Advertiser" on Thursday, under the heading of Perth: "At the meeting of the Town Council on Monday evening, attention was attracted to what was described as the bad quality of the gas supplied that morning for the purpose of illumination. Inquiries go to prove that this was the result of a serious breakdown at the works. These are entirely dependent upon one engine for breaking cannel coal; and this has been operating day and night incessantly without any stand-by in case of necessary repairs or of breakdown. At three o'clock on Sunday morning this engine collapsed, with the result that the system was suddenly thrown out of gear, and gas making had to be suspended. Unfortunately, at that early hour, outside engineers were not available, and as many of the staff as could be reached were hurriedly summoned together to deal with a serious emergency. The circumstance that none of the workmen are employed on Sunday aggravated the situation. However, the staff managed to effect temporary repairs; and by the following morning the machinery was restarted. In consequence of the suspension of operations, the Manager was compelled to draw upon the reserve, to supply consumers upon the Sabbath evening. It was at this stage that matters assumed their most serious aspect—there being a not very remote possibility of the town being plunged into darkness. Mr. M'Lusky's resource, however, extricated him from a rather embarrassing situation. He had recourse to what is known as Dundee gas, manufactured from common coal; and this was supplied to the public works on Monday morning. The illumination obtainable from this common gas is expressed in 16 to 18 candle power, as compared with 24 to 27 candle power furnished by the average gas produced at the Perth works. It may be stated that the Council are at present duplicating portions of the machinery at the works; and this breakdown should emphasize the necessity of its being pushed forward with all despatch." As to this, it may be mentioned that the Councillors on Thursday considered proposals by various departments of the Corporation for increased borrowing powers. The Convener of the Gas Committee—Mr. Cuthbert—said they only asked the modest sum of £15,000. It was, he said, absolutely essential that they should have full borrowing powers, as their capital expenditure at the present time was such that £15,000 would be required within a very few years. The whole subject of additional borrowing powers was sent to a Committee for consideration.

The report by Mr. W. R. Herring, of Edinburgh, upon the condition of the Denny Corporation Gas-Works, was laid before the Town Council this week. Generally speaking, he said, he was happy to be able to report that he had found the works and plant in a very satisfactory state of repair. It appeared to be well proportioned for the work demanded of it, and had been well maintained. A few alterations and additions which he suggested would ensure their having a thoroughly satisfactory plant for the production of gas. As to the distributing system, there appeared to be a satisfactory pressure throughout the district, and no works of any considerable magnitude were necessary in this respect. In fact, the leakage account appeared to have been considerably reduced—to the extent of 3 per cent. as compared with the former year. In regard to the financial position of the undertaking, he had made an analysis of the revenue account for the year ending May 15, 1903; and so far as the items under the heading of expenditure were concerned, they would compare favourably with other works of the same size, except the items "rates, rents, taxes, &c." It appeared to cost them practically 4½d. per 1000 cubic feet to meet these charges, which was certainly very heavy. The Corporation seemed to be receiving a fair price for the coke they were able to sell; but the return for tar and ammoniacal liquor was not so great as he thought it should be. Alterations to the washers and scrubbers which he suggested should, he considered, improve the position of this product. The capital account of the undertaking was large in proportion to the capacity of the works; and this item would, to a great extent, account for the high proportion they had to pay under the heading of rates and taxes. Concluding, Mr. Herring said: "Bearing in mind the fact that your works are capable of producing more gas than you at present have sale for, and, further, that by the introduction of prepayment meters, together with small cooking stoves or grillers, you might perhaps be able to very largely increase the consumption of gas during daylight hours, you have still a chance of reducing this

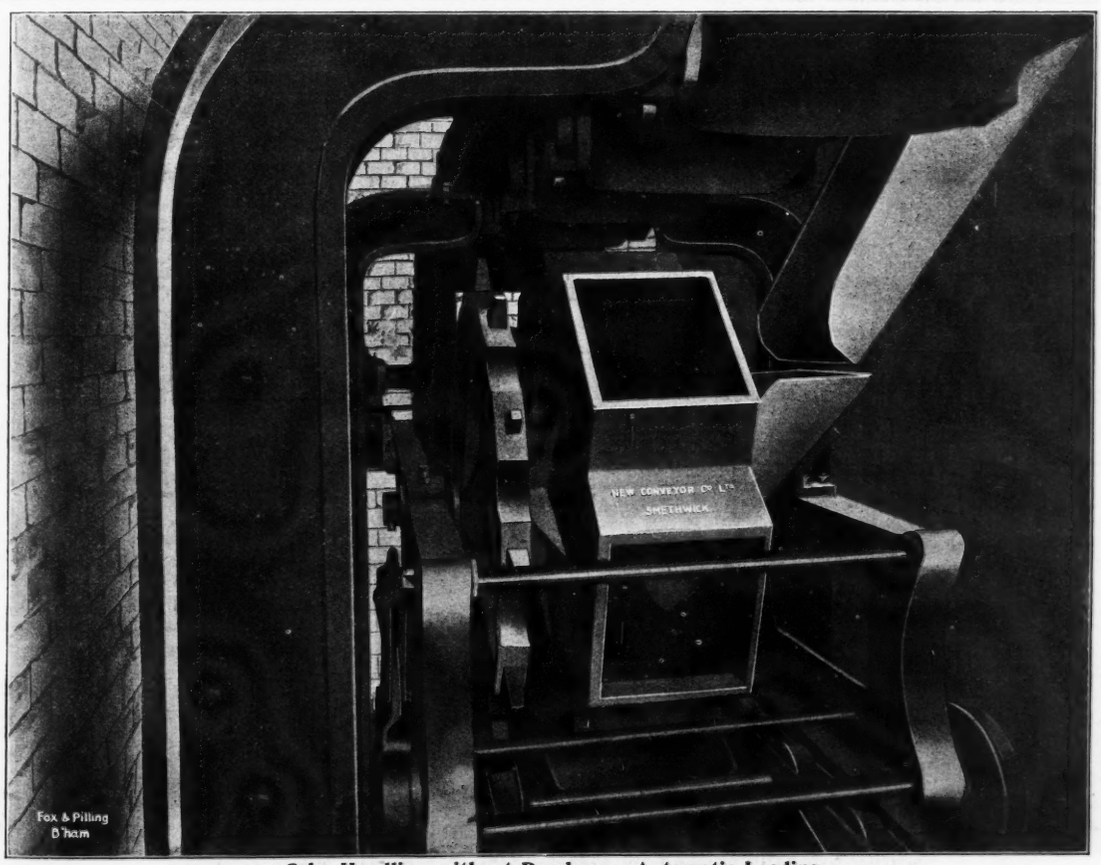

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figure relatively to the amount of work done. Every thousand feet of gas you can sell in addition to your present output will be available at practically the bare working costs; the interest and sinking fund charges and the rates and taxes remaining the same on the increased quantity produced. You should, therefore, leave no stone unturned that is likely to bring this increased consumption." The Council adopted the report, and approved of the resolution of the Gas Committee to have Mr. Herring's suggestions carried into effect.

The Moffat Gas Company have been the first this year with their annual meeting, which was held on Friday of last week. It was reported that the balance of profit on the working for the year amounted to £601, to which there fell to be added £133 brought forward from the previous year—making £734. The shareholders agreed to the proposals of the Directors to write off £100 for depreciation of works, and £50 for depreciation of meters and cookers; leaving a sum of £584 for distribution. Out of this, it was agreed to pay dividends of 2s. 6d. per share on the guaranteed stock, and 15s. per share on the £3000 of net ordinary shares—amounting to £325—and to place £100 to the reserve fund; carrying forward £159. It was also agreed to reduce the price of gas from 4s. 7d. to 4s. 2d. per 1000 cubic feet.

At the meeting of the shareholders of the Coatbridge Gas Company on Thursday, it was resolved, after a long discussion, that opposition to the Airdrie Gas Provisional Orders should be dropped.

The Town Council of Stonehaven have resolved to replace the ordinary flat-flame burners in the public lamps by incandescent burners. Provost Mowat, in speaking to the subject, said that the cost of gas for an ordinary lamp is 10s. 5d. a year, but that with incandescent burners the charge will be 6d. more. The latter, however, would prove a better bargain.

The Workmen's Compensation Act has been the occasion of numerous decisions of a peculiar nature, some of which, but for the fact that they involved hardship to the one party or the other, would have been positively comical, resembling, in the world of fact, the creations, in the world of imagination, of Mr. W. S. Gilbert. An action to which, in my opinion, such a description can be fitly applied, has been decided by Sheriff-Substitute Maconochie in the Edinburgh Sheriff Court. The claimant, a girl named Johnson, was employed in the factory of Messrs. Alder and Mackay, Gas-Meter Manufacturers, of Edinburgh, at a wage of 14s. a week. She stated that on July 15 last she and other girls were at work in a room, when they were startled by a loud noise, as of an explosion. The girl Johnson rose from her seat and went to a corner of the room, where she became faint, and required to be supported by a fellow-worker. In the evening, at her home, she was seized with a severe fit of a hysterical character, and since that time she had been under medical care. She had suffered from epileptic fits and palpitation of the heart, which, it was averred, had been organically affected. The respondents maintained that Johnson had never been a strong girl, and that the loud noise which she heard on July 15 was not the cause of her weak health. Evidence was led on the subject; and the Sherift-Substitute, upon it, finds the respondents liable in compensation, which he fixes at 7s. a week, the sum claimed, with expenses. The decision is open to review, and will probably be appealed.

Mr. Charles Hawksley was the guest of the Aberdeen Association of Civil Engineers at their annual dinner last Saturday evening. Mr. Hawksley is the Consulting Water Engineer to the Corporation of Aberdeen; and, taking advantage of his presence in the city, the Water Committee held a conference with him and his son—Mr. Kenneth C. Hawksley—on Monday, upon the subject of the proposed augmentation of the city water supply. Mr. Hawksley and his son visited the proposed sources of supply, in the valleys of the Dee and the Avon, and reported upon them last year. In that report he favoured the taking of the water from the River Dee above Ballater, but below the confluence of that river with the tributary stream, the Gairn. The Water Committee were chiefly anxious to know what weighed with him in his practical rejection of the Avon scheme. He expressed the opinion that the Dee and the Avon sources were both equally suitable. As to the question of contamination, he agreed that, while no doubt a supply from the Avon would be the purer of the two, he was perfectly satisfied that there was no danger of contamination from the Dee. He regarded the alleged danger of contamination as a sentimental objection; but if that sentimental objection were to weigh with them, he would certainly say, "Expend an additional £140,000 or so, and take a new supply from the Avon." On the question of filtration, he was of opinion that if the additional supply were taken from the Dee at Cairnton—the present intake—it could be made absolutely safe for human consumption. He was of opinion that a supply of water of good quality, sufficient to meet the requirements of the city for the next fifty years, could be taken from the Dee at Cairnton, and at an incomparably less cost than by any of the other schemes he had considered. The Cairnton scheme would cost £300,000 less than the Avon, and £140,000 less than the Ballater scheme. The Ballater scheme he estimated to cost £657,000. The Water Committee are to consider a statement which Mr. Hawksley handed in. In the meantime, it is reported, they are highly satisfied with the result of their interview.

The Edinburgh and District Water Trustees, at a meeting on Thursday, resolved, upon a report by Mr. W. A. Tait, their Engineer, to apply for a Provisional Order authorizing them to borrow additional money for the completion of the Talla scheme of augmentation. The Trust possess powers to borrow £1,150,000 for this purpose, of which they have expended £913,346. The original estimate of the works was £1,290,000. In addition to seeking powers to borrow the full amount, it is proposed to expend about £15,000 upon filters at the service reservoir at Alnwickhill, and to apply for money for the construction of some other smaller works. Mr. Tait said he made his estimate on the assumption that the total cost for land and wayleave and parliamentary and legal expenses, &c., did not exceed £120,000. If this figure was understated, the estimate must be correspondingly increased. It took no account whatever of recent Trust expenditure.

CARBURETTED WATER-GAS APPARATUS

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	Cub. Ft. Daily.		Cub. Ft. Daily.		Cub. Ft. Daily.
BLACKBURN	1,250,000	ST. CATHERINES (Remodelled)	250,000	ACCRINGTON	500,000
WINDSOR ST. WORKS, BIRMINGHAM	2,000,000	KINGSTON, PA.	125,000	TONBRIDGE	300,000
SALTLEY WORKS, BIRMINGHAM	2,000,000	PETERBOROUGH, ONT.	250,000	STRETFORD	500,000
COLCHESTER	300,000	WILKESBARRE, PA.	750,000	OLDBURY	300,000
BIRKENHEAD	2,250,000	ST. CATHERINES (Second Contract)	250,000	TODMORDEN	500,000
SWINDON (New Swindon Gas Co.)	120,000	BUFFALO, N.Y.	2,000,000	SALTLEY, BIRMINGHAM (Third Contract)	2,000,000
SALTLEY, BIRMINGHAM (Second Contract)	2,000,000	WINNIPEG, MAN.	500,000	YORK (Second Contract)	750,000
WINDSOR ST., BIRMINGHAM (Second Contract)	2,000,000	COLCHESTER (Second Contract)	300,000	ROCHESTER (Second Contract)	500,000
HALIFAX	1,000,000	YORK	750,000	NEWPORT (MON.)	250,000
TORONTO	250,000	ROCHESTER	500,000	TOKIO, JAPAN	1,000,000
OTTAWA	250,000	KINGSTON, ONT.	300,000	PERNAMBUCO (Brazil)	125,000
LINDSAY (Remodelled)	125,000	CRYSTAL PALACE DISTRICT	2,000,000	MALTON	150,000
MONTREAL	500,000	DULUTH, MINN.	300,000	DULUTH, MINN. (Second Contract)	300,000
TORONTO (Second Contract Remodelled)	2,000,000	CATERHAM	150,000	BROCKVILLE (ONT.)	250,000
BELLEVILLE	250,000	LEICESTER	2,000,000	SMETHWICK	500,000
OTTAWA (Second Contract)	250,000	ENSCHEDE (HOLLAND)	150,000	GRAVESEND	300,000
BRANTFORD (Remodelled)	200,000	BUENOS AYRES (RIVER PLATE CO.)	700,000	NEWPORT MON. (Second Contract)	250,000
		BURNLEY	1,500,000	TORONTO (Third Contract)	750,000
		KINGSTON-ON-THAMES	1,750,000	TORONTO (Fourth Contract)	1,000,000

Complete Gas-Works at NELSON, BRITISH COLUMBIA.

LEEDS, 1,800,000 C. Ft. LEICESTER (2nd Cont.), 1,000,000 C. Ft. NEWCASTLE-ON-TYNE, 1,800,000 C. Ft.
MONTREAL, ONT. (Second Contract), 1,800,000 C. Ft. HAMILTON, ONT., 400,000 C. Ft.

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *Feb.* 13.

Sulphate of Ammonia.

There has been an entire absence of activity; but although available supplies appear to be abundant, the decline in prices is very gradual. The closing quotations are £12 11s. 3d. per ton f.o.b. Hull, and £12 12s. 6d. to £12 15s. per ton f.o.b. Liverpool and Leith. There is speculative selling on the Continent at below these figures for near delivery; but for March and April, a premium is required, it being anticipated that a spell of favourable weather would bring out large buyers, who at present are holding back. Makers ideas for forward delivery continue to be quite out of reach of buyers.

Nitrate of Soda.

This article is firm on spot at 9s. 10½d. to 10s. 1½d. per cwt., according to quality; but on the Continent the market has assumed a quieter tone, both for prompt and spring delivery.

LONDON, *Feb.* 12.

Tar Products.

Business in tar products is generally quiet; and prices as a rule have a downward tendency. There is really nothing fresh to report in pitch; but, if anything, prices are a trifle easier. There is certainly, however, more inquiry from South Wales, both for prompt and forward delivery; but as regards the Continent, consumers appear inclined to wait before contracting for their supplies. Benzol continues very quiet indeed. Sales are reported in 90 per cent. at 10½d. per gallon f.o.b. London, while in the North some considerable quantity has been placed at rather lower prices. In 50-90 per cent., business has been done at 7d. per gallon for home consumption; but consumers as a rule are not much interested in this quality. It is very difficult to fix the actual value of carbolic acid, as makers here believe in a considerable increase in price should war continue. 60 per cent. is still quoted nominally at 1s. 6½d. to 1s. 7d., according to position; but makers decline to sell for forward delivery. Crystals are also slightly better; the German makers having advanced their quotation to 5½d. for 39-40 per cent. There is really nothing to advise in solvent naphtha and toluol; there being an entire absence of business in both these articles. Prices are therefore purely nominal. The markets in creosote are rather easier all round, especially in the North, where sales are reported at slightly lower figures than have been ruling lately. Business in anthracene continues to be restricted to small parcels of "A" quality for prompt delivery; but as regards forward, makers decline to entertain business at under 2½d. per unit. This price consumers are not at present prepared to pay. There is nothing important to advise in tar; but prices are certainly easier.

The average values during the week were: Tar, 20s. to 24s. Pitch, London, 34s. 6d. to 35s.; east coast, 32s. 6d. to 33s.; west coast, 31s. 9d. to 32s. Benzol, 90 per cent., 10½d. to 10¾d.; 50-90 per cent., 7d. to 7¼d. Toluol, 7¼d. to 7½d. Crude naphtha, 3d. to 3¼d.; solvent naphtha, 8d. to 9¾d.; heavy naphtha, 10¾d. to 11d. Creosote, London, 1¾d.; North, 1½d. Heavy oils, 2¼d. to 2½d. Carbolic acid, 60 per cent., 1s. 6¼d. to 1s. 7d. Refined naphthalene, £5 to £7 10s. Salts, 23s. to 26s. Anthracene, "A" quality, 1⅞d. to 2d.; "B" quality, 1d. nominal.

Sulphate of Ammonia.

The market closes with a very quiet tone; and there is an absence of business all round. Beckton now quote £12 17s. 6d. in any position, but do not find buyers even at this price. The South Metropolitan price is £13 for February-March shipment—their own terms; but they do not find buyers open to pay this figure. The Leith market is quiet; and the value may be taken as £12 15s. But even at this figure there is absolutely no business doing. There is really no business doing at Liverpool. The nominal price is £12 15s. February-March. Early in the week a little business was done in Hull for February-March shipment at £12 15s.; but at the present moment there are no buyers.

COAL TRADE REPORTS.

Lancashire Coal Trade.

Only a dragging sort of business continues with regard to the coal trade of this district, and four to five days per week represents about the full average that pits are running—many of the house-fire coal collieries barely putting in four days. Other descriptions of fuel continue in limited request for iron-making, steam, and general manufacturing purposes. The better qualities of round coal suitable for house-fire purposes remain about 13s. 6d. to 14s. 6d. per ton for best Wigan Arley, 11s. and 11s. 6d. to 12s. 6d. for inferior Arley and Pemberton four-feet, and from 9s. 6d. to 10s. 6d. for common house coals. Users of common round coals for iron-making and steam purposes are mostly buying only to cover current requirements. There is, however, little or nothing doing in the way of forward contracts to afford any actual test of the market, which will only come when the railway and gas coal contracts have to be settled. For the present, inland prices are about steady at 8s. to 8s. 3d. per ton for the commoner sorts of steam and forge coals, up to 8s. 6d. and 8s. 9d. for some of the better sorts. For shipment, below these figures is taken; and delivered on the Mersey ports or the Manchester Ship Canal, steam coals can be bought at 9s. to 9s. 6d. up to 9s. 9d., according to quality. Slack is gradually getting more plentiful on the market. To some extent this is stated to be due to the gas companies in many cases not taking their quantities. Last year they contracted rather freely in slack, and some collieries booked pretty heavy contracts. The mill stoppages in the manufacturing districts are also throwing a good deal of slack upon the market. For the present, better qualities are tolerably firm at late rates; but there is some low cutting in inferior descriptions, especially with surplus

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output from other districts, and there are anticipations of lower prices. The better qualities are still fetching about 6s. to 6s. 6d. per ton at the pit; medium sorts 5s. to 5s. 6d., with common slacks ranging from 4s. to 4s. 6d.

Northern Coal Trade.

The coal trade of the North-East has been a little disturbed by the political uncertainty; but as it has been seen that there is no immediate change probable, the quietness of this season has to a large extent returned. Best Northumbrian steam coals are now quoted at about 9s. per ton f.o.b., second-class steams at 8s., and steam smalls at 3s. 9d. Some of the collieries have now and then to work short time—a not unusual event at this time of the year. In the gas coal trade, the demand is still a full one; but the contract quantities are now less than they were, though the production is well taken up—more especially of the better qualities. No heavy contracts have been concluded of late; but one or two are in negotiation at about 6d. per ton below prices of a year ago. Gas coke is irregular. On the Tyneside, from 13s. to 14s. per ton f.o.b. is quoted for good qualities; but at some of the inland works prices are weaker.

Scotch Coal Trade.

Trade is still lifeless; but very soon attention will be taken up with yearly contracts. The influence of the question has not yet begun to be felt, however; but judging from appearances, the prospect is altogether favourable to buyers. This expectation may, of course, be superseded by complications which may arise out of the war now in progress, as to which it is too soon to say anything. The prices quoted are: Main 7s. 6d. to 7s. 9d. per ton f.o.b. Glasgow ell 8s. 6d. to 9s. 3d., and splint 9s. to 9s. 6d. The shipments for the week amounted to 186,741 tons—an increase of 5498 tons upon the previous week, but a decrease of 24,462 tons upon the corresponding week of last year. For the year to date, the total shipments have been 879,836 tons—a decrease of 48,620 tons upon the same period of last year.

Incandescent Gas Lighting at Burton-upon-Trent.—The superiority of the incandescent gas system for the lighting of public streets is amply demonstrated by the complaints of a correspondent writing to one of the Burton-upon-Trent newspapers. He states that when passing from a street where incandescent lights are fitted up into one in which the flat-flame burners are still in existence, "the faint glimmer is almost like Cimmerian gloom." This makes traffic difficult at night time; and several narrow escapes from collision have recently occurred at the spot referred to. The Gas Engineer (Mr. F. L. Ramsden) is, however, rapidly pushing forward the work of converting the flat-flame burners to the incandescent system; and the opportunity the ratepayers now have of comparing the two lights, will enable them to fully appreciate the improvement that is being effected.

Increased Assessment of the Exeter Gas-Works.—The Exeter Board of Guardians have authorized the Assessment Committee to obtain legal assistance in defending an appeal which has been entered by the Exeter Gas Company against an increase made in the rateable value of their property. The amount has been put up by £300 in respect of the mains, which are about 70 miles in extent, and from £1300 to £4377 for the works.

Nuneaton Water Supply.—The Engineer of the Nuneaton Water-Works (Mr. F. C. Cook) has prepared a return showing that during last year the total consumption was 177,644,679 gallons, representing an average daily supply of 486,698 gallons, compared with 340,000 gallons in 1900—an increase of 43 per cent. The number of houses increased during the year from 4590 to 4970, and the estimated population supplied from 22,950 to 24,850.

Water-Works Extensions at Widnes.—The Widnes Town Council have decided to proceed with extensions at their Stocks Well pumping-station, at an estimated cost of £14,000. This work received the sanction of the Council as far back as 1895; but there was then depression in the town, and it was not carried out. Latterly, however, there has been a largely increased consumption of water; and therefore it has been thought desirable to undertake this extension.

Decreased Gas Consumption at Bolton.—It was stated at the last meeting of the Bolton Town Council that there is being experienced a slight decrease in the output of gas, instead of the increase which has hitherto been the custom. The reasons for this are said to be the spread of incandescent gas lighting and the fact that many former good customers are now generating their own electricity. The Deputy-Mayor (Alderman Miles), however, gave it as his opinion that at the close of the year there would not be the shrinkage in the revenue which at present appeared to exist.

Belfast and North-East Ireland Electricity and Power Gas Scheme.—The Corporation of Belfast have decided to abandon their intention of opposing this scheme, on the following terms: "The city to be excluded from the area of supply; power to the Company to supply energy or power gas to the Belfast Harbour Commissioners for use by the Commissioners on harbour works; and the Corporation to agree to a reasonable way-leave from the station site scheduled in the Bill for a line to connect the site with a point on the northern boundary of the city and a point on the southern boundary."

Wet v. Dry Meters at Belfast.—Last March, the Belfast Corporation Gas and Electric Committee resolved that gas consumers should be allowed the option of having dry meters without paying a deposit, on changes of existing meters being found necessary by the department or in the case of first supply of a meter to a new house; but that if a dry meter was insisted on when the existing wet meter was certified to be in efficient working order, the consumer should pay half the cost of same. The latter stipulation has now been rescinded; and the Committee have resolved to return to consumers £96 which has been received in accordance therewith.

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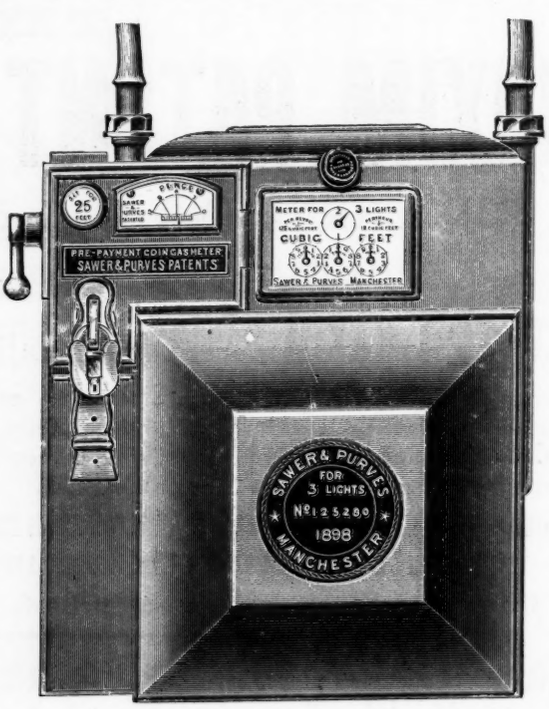

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AND
NOTTINGHAM.

IT HAS INCREASED IN RATIO TO THE ABOVE, SINCE THE POPULARITY AND PRE-EMINENCE OF THE "POSITIVE" SLOT METER BECAME PRONOUNCED.

Bursting of a Reservoir in Spain.—According to a telegram received through Reuter's Agency, a reservoir burst last Thursday at Caldas de Moledo, near Oporto, owing to prevailing floods, destroyed part of the Douro railway line, and caused the loss of 17 lives.

"Gas Smells" at New Bushey.—The New Bushey Ratepayers' Association have unanimously passed a resolution protesting against the pollution of the atmosphere by the Watford Gas Company, and requesting the Watford Urban District Council to take such steps and adopt such measures as may be necessary to secure the abatement of the nuisance. A copy of the resolution is to be sent to the Council.

Failures of the Electric Light.—Early last Tuesday morning, a slight explosion occurred at the premises of the Smithfield Central Market Electric Supply Company, with the result that the market was in darkness for about two hours. A little gas was available, but it was entirely insufficient to light the huge place, and trade was entirely at a standstill for a long time. A sudden failure of the public electric light service at Huddersfield about 7.45 last Thursday evening caused some inconvenience, besides being rather startling in places of public resort. At the Theatre Royal, the first act of a play was got through by the aid of candles on the stage, and then the people had to be dismissed. The only street lighting in the central portions of the town was that given by passing electric cars, whose current is derived from the tramways supply station. It appears that the failure was caused by the water-supply pipes for the boilers at the electric lighting works having become choked, so that water could not be obtained. It was nearly two hours before one engine was got to work again and a supply of power was available to furnish current.

History of Gas Lighting at St. Austell.—The following paragraph referring to the history of gas lighting at St. Austell appears in the "West Briton and Cornwall Advertiser." "The meeting of the St. Austell Gas Company recently recalls some interesting recollections with regard to the introduction of gas for lighting purposes into the town. Gas was first made in St. Austell about seventy years ago, by Mr. James Thomas, who conceived the idea when making coke for his foundry. Meter and meter rents were then unknown. The charge was ½d. per hour per lamp; and at midnight the supply was cut off. The works were next taken by a Mr. Hodge, and in turn by Captain P. Clymo. At the death of Mr. Clymo, the gas was 6s. 4d. per 1000 cubic feet; and it was then felt advisable to form a Company. In 1870, through the efforts of the late Mr. William Coode, a Company was successfully formed. In 1874, Mr. John Nicholls was appointed Manager, in place of Mr. W. Hancock; and he held the position until 1893. During this period, the works were considerably enlarged, and lighting by gas became general in the town. Mr. Nicholls was succeeded by Mr. Ingram, now of Truro; and by the aid of new inventions, such as the incandescent burners, he thoroughly revolutionized the works. The system of heating and cooking by gas was then in its infancy; and in Mr. Ingram's hands it has developed to the advantage of Company and consumer."

Water Supply of Rio de Janeiro.—A new water scheme is under consideration at Rio de Janeiro. It is proposed to increase the daily supply to 46⅜ million gallons. The cost of the works contemplated is estimated at £1,000,000. More attention is to be paid to distribution, which is at present defective.

Satisfactory Results at Tredegar.—Mr. W. Lloyd Roach, the Manager of the Tredegar Gas-Works, has reported to the Council that the profits for the year to December last amounted to the satisfactory sum of £667. Considerable outlay was incurred in following up old leakages; the unaccounted-for gas having thus been reduced from the abnormally high figure of 25 per cent. in 1902 to 4¾ per cent. Mr Roach claims that, in practically one year, he has been able to convert the works into a paying concern, which, if properly attended to, should produce an annual income of at least £1000. The Chairman of the Council (Mr. J. Reynolds) congratulated Mr. Roach and the ratepayers on the results obtained.

Tenders for the issue of 1000 £10 "B" shares (7 per cent.) in the Bournemouth Gas and Water Company were opened at the office of the Company on Thursday. The shares, which were over-applied for, were all allotted at an average price of £15 4s. 9d. each.

Messrs. Joseph Taylor and Co., of Bolton, have received, among others, orders for 1½-inch plate lead saturators, with double detachable ammonia pipes, detachable acid pipes, &c., for the Eastbourne, Devonport, and Gorleston and Southtown Gas-Works, and for a 1-inch saturator for the Stourport Gas Company.

The following tenders have been accepted by the Abergavenny Town Council, on the recommendation of the Gas Committee: Drakes, Limited, for regenerative retort-settings, £1925; Messrs. Holmes and Co., for a washer-scrubber, £475; Messrs. Biggs, Wall, and Co., for a "Rapid" charging-machine and a rolled steel scoop, £98 15s.

On Monday last week, the "Simplex" refuse destructor which Messrs. Meldrum Bros., Limited, have erected in connection with the electric lighting and traction installation of the Burnley Corporation; and which has been working for several months, was formally inaugurated. The ceremony was preceded by a luncheon, to which the members of the Corporation and the officials were invited by the Chairman of the Health Committee (Alderman W. Dickinson, J.P.). On an average, 230 tons of refuse have to be destroyed weekly, and the following is a percentage analysis of the resulting clinker: Silica, 40·6; lime, 11·2; alumina, 18·5; ferric oxide, 22·8; and magnesia manganese and alkali, 6·9. The great heat which the refuse creates in its combustion is carried through a boiler, so that a continuous pressure of 350-horse power of steam for 15 hours a day is supplied to the adjoining electricity station. Using 40 tons of refuse a day, a saving of 8 tons of coal was effected, equal to £4, or £1200 a year. The destructor and boiler cost £300; and enough heat escapes to serve another boiler.

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Mr. James Whittaker, who has been in the service of the Gas Department of the Manchester Corporation for 57 years, has handed in his resignation. He commenced as an office boy, and afterwards for 44 years was a collector of gas-rents; being for the last 20 years the senior collector. The Gas Committee on Friday accepted Mr. Whittaker's resignation with regret, and passed a resolution recording their high appreciation of the faithful and efficient manner in which he had discharged his duties during the long period of his service under the Committee. The address will be illuminated and framed before being formally presented to the recipient.

We learn that it has been decided by the Directors of the Municipal Gas-Works at Amsterdam to construct an extensive installation of carburetted water-gas plant at their Linnaeusstraat station, and that the contract for the work has been placed in the hands of Messrs. Samuel Cutler and Sons, of Millwall, and will comprise all their latest and varied improvements in details of this apparatus. The same firm have, we understand, been entrusted with the construction of a new gasholder for the Hitchin Gas Company. It is to be guided by Cutler's system of framing, and the work is to be carried out under the superintendence of the Company's Engineer, Mr. W. R. Phillips, of Luton.

The Water-Works Commission in South Australia, appointed to inquire into the manufacture of cast-iron pipes at the Glanville Works, report that, in their opinion, the State has not benefited by the establishment of these works. As against this, the Commissioner of Audit maintains that the State foundry is not only able to carry out a contract at the price submitted, but that a margin will be available for interest, depreciation of plant, and profit. In connection with the manufacture of pipes by the South Australian Government, it is interesting to note that the proposal to purchase the works of the late firm of Messrs. G. E. Fulton and Co., Limited, of Kilkenny, near Adelaide, has been vetoed by the Legislative Council.

The Directors of the Nernst Electric Lamp Company have put forward a scheme of reconstruction which, according to the "Financial News," is an extremely drastic one. It is proposed to write down the capital from £320,000—£140,000 in preference and £180,000 in ordinary shares of £1 each—to £90,000, giving the preference holders one new ordinary for each two preference shares, and the ordinary proprietors one for nine. The preference holders would thus have £70,000, against the £20,000 to be given to the present ordinary proprietors, and would, therefore, obtain the control which they have not heretofore possessed. In the circumstances, the arrangement appears to our contemporary to be fair to the two classes of proprietors.

The James Keith and Blackman Company, Ltd., have, within the past few days, received an order from the Belfast Harbour Commissioners for a complete Keith light plant, with duplicate compressors, equalling an illuminating power of 18,000 candles. This makes the third order from the same source for installations during the past twelve months; and the Commissioners will have, when the new contract is completed, four high-pressure plants, the whole of which are supplied with gas from water-driven compressors. The Company have also obtained an order for a high-pressure installation, to be put up over the urinal at the end of Tooting Broadway. The pillar in this case is of very handsome design, having five arms, on each of which a lamp, containing a burner giving 300 candles, is fixed. The compressor is being placed in the convenience below. Another installation the Keith and Blackman Company are proceeding with is for the London County Council's western pumping-station, Grosvenor Road.

We have received from Mr. S. Edgecumbe Rogers "The Local Government Annual and Official Directory for 1904." This is the thirteenth year of publication, and the present edition contains several new features. One of these is the insertion of the names of the Chairmen of Committees of the Metropolitan Borough Councils and of the London County Council. Another is a list of the members of the Metropolitan Water Board, with their addresses. This is the first appearance of such a list in the works of reference which have come under our notice; and it would have been rendered more useful if the places and bodies represented had also been given. In the directory portion of the book will be found the names and addresses of the chief officials of all Corporations, London Borough Councils, County Councils, Boards of Guardians, Urban and Rural District Councils, &c., throughout the kingdom. In addition to the directory, there is a large quantity of information relating to the public libraries, baths and washhouses, and gas, water, and electric light undertakings in London; and an abstract is given of the local government legislation of the past year. The book is published at 27A, Farringdon Street, London.

Referring to the paragraph in the "JOURNAL" for the 19th ult respecting the reduction in the salary of Mr. A. Bond, the Gas Manager to the Aberavon Corporation, by the Finance Committee, it appears that there is some difference of opinion in the Corporation as to the power of the Committee to control salaries. At the last monthly meeting of the Town Council, Mr. J. M. Smith moved that the salaries of the respective officials be referred to the several Committees by whom the officials were controlled. The Town Clerk (Mr. M. Tennant) said the Gas Committee had the full control of the gas-works and their officials. The Mayor (Mr. G. Clarke) asked the Town Clerk why he did not advise the Council when the question was discussed respecting the salaries of the officials. The Town Clerk replied that he was not asked for his opinion. Mr. F. B. Smith said his reading of the Gas Act was different from that of the Town Clerk, and he contended that the Finance Committee had full control over the salaries of the officials. The Town Clerk read extracts from the Act in which full discretion was given to the Gas Committee. The Mayor said he ruled that the discussion respecting the Gas Manager's salary was out of order. The cutting-down process was then continued; it being stated that the borough was in a bad way, having an overdraft of £5000 at the bank. The salary of the Surveyor was reduced from £200 to £150 per annum, with the privilege of taking two pupils. This was done on an amendment to a motion that the reduction should be made without according this privilege.

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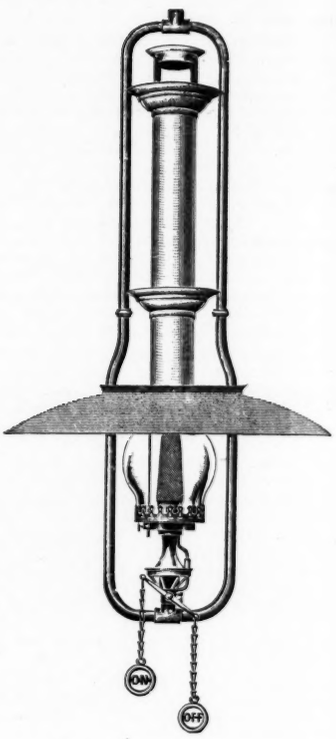

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Sale of Stock.

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One Q-Clay RETORT, 21 in. by 16 in. by 9 ft.
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One Vertical STEAM-BOILER, 6 ft. by 2 ft. 6 in. insured to 50 lbs., with Safety-Valve complete.
One STATION GOVERNOR, with 8-inch Inlet, Outlet, and Bye-Pass Valves, complete, by Geo. Orme.
One STATION GOVERNOR, as above, with 8-inch Valves, by Alex. Wright and Co.
All the above are in good working order.
Further Particulars from, and Tenders endorsed to, G. B. SMEDLEY, Engineer.
Gas-Works, Swadlincote.

ASHFORD (KENT) URBAN DISTRICT COUNCIL
(GAS DEPARTMENT.)
THE Gas Committee invite Offers for the purchase of the whole of the SULPHATE OF AMMONIA made at their Gas-Works during the ensuing Twelve Months from March 31 next; the probable amount being 55 Tons. Also for the supply of about 55 Tons of BEST SULPHURIC ACID during the same period.
Further Particulars and Form of Tender can be obtained from the undersigned, to whom all Tenders must be sent on Thursday, Feb. 25, 1904.
JOHN MORTON, Manager.
Feb. 13, 1904.

RADCLIFFE AND PILKINGTON GAS COMPANY.
PIPES AND SPECIALS.
TENDERS are invited for the supply of 450 yards of 6-inch, 300 yards of 4-inch, and 600 yards of 3-inch Spigot and Socket Cast-Iron GAS-MAINS and a number of SPECIALS.
Further Particulars may be obtained from the undersigned, by whom Tenders will be received until Tuesday morning the 1st of March next.
JAMES BRADDOCK, Manager and Secretary.
Gas Offices, Radcliffe, Feb. 9, 1904.

COUNTY BOROUGH OF ROTHERHAM.
(GAS DEPARTMENT.)

THE Gas Committee of the above Corporation are prepared to receive TENDERS for the supply and delivery of RETORTS, FIRE-BRICKS, &c., as required.

Further Particulars and Form of Tender may be obtained on application to the undersigned.

Tenders, endorsed "Retorts, &c.," to be addressed to the Town Clerk, and to be delivered not later than Tuesday, Feb. 16.

The Committee do not bind themselves to accept the lowest or any Tender.

FRANK A. WINSTANLEY,
Engineer and Manager.

BOROUGH OF BARROW-IN-FURNESS.

THE Corporation are prepared to receive TENDERS for the purchase of the surplus GAS TAR and OIL GAS TAR produced at their Gas-Works from the 1st day of April next to the 31st day of March, 1905, delivered into the Purchaser's Tank-Waggons and Barrels at the Gas-Works Siding.

Any further Information may be had on application to the Manager of the Gas-Works.

Sealed Tenders, addressed to the Chairman of the Gas and Water Committee and endorsed "Tender for Tar," to be delivered at the Town Clerk's Office on or before Tuesday, the 23rd of February, 1904.

The highest or any Tender not necessarily accepted.

By order,
C. F. PRESTON,
Town Clerk.

Town Hall, Barrow-in-Furness,
Feb. 2, 1904.

BOROUGH OF BARROW-IN-FURNESS.

THE Corporation are prepared to receive TENDERS for the supply of Machine-moulded FIRE-CLAY RETORTS, FIRE-BRICKS, CAST-IRON PIPES, WROUGHT-IRON TUBES and FITTINGS, BRASS COCKS, GAS-METERS, GAS-COOKERS, OIL, LIME, IRONMONGERY, and SULPHURIC ACID as may be required from the 1st day of April next to the 31st day of March, 1905.

Sealed Tenders, on Forms to be obtained at the Office of the Manager of the Gas and Water Works, addressed to the Chairman of the Gas and Water Committee and endorsed "Tender for Stores," to be delivered at the Town Clerk's Office, on or before Tuesday, the 23rd of February, 1904.

The lowest or any Tender not necessarily accepted.

By order,
C. F. PRESTON,
Town Clerk.

Town Hall, Barrow-in-Furness,
Feb. 2, 1904.

EDINBURGH AND LEITH CORPORATIONS' GAS COMMISSIONERS.

TAR.

THE Commissioners are prepared to negotiate TENDERS for the removal of their surplus TAR from the Edinburgh and Granton Gas-Works, amounting to 12,000 to 15,000 Tons per annum, on the basis either of the valuation of Tar Products, or at per ton.

Contracts to hold good for periods of One, Two, or Three Years.

The Tar will be loaded into Tank-Waggons at the Gas-Works.

Further Particulars and the fullest Information can be obtained upon application to Mr. W. R. Herring, M.Inst.C.E., Chief Engineer and Manager, New Street, Edinburgh.

JAMES M'G. JACK,
Clerk.

25, Waterloo Place, Edinburgh,
Feb. 1, 1904.

WALLASEY URBAN DISTRICT COUNCIL.
GAS-WORKS EXTENSIONS.

TO ENGINEERS AND MAKERS OF GAS PLANT.

THE Wallasey Urban District Council are prepared to receive TENDERS for the manufacture, delivery, and erection of PURIFIERS at their Gas-Works, Great Float, near Birkenhead.

Plans may be seen, and a copy of the Specification obtained, on application to the Engineer, Mr. J. H. Crowther, at his Office at the Works.

Sealed Tenders, on the Form embodied in the Specification, addressed to the undersigned and endorsed "Tender for Purifiers," to be delivered per post at my Office, as below, not later than the morning of Thursday, the 17th day of March, 1904.

The Contractor will be required to enter into a bond with approved Sureties for the due performance of the contract.

The Council do not bind themselves to accept the lowest or any Tender.

By order,
H. W. COOK,
Clerk and Solicitor.

Public Offices, Egremont,
Cheshire, Feb. 5, 1904.

BROMLEY GAS CONSUMERS' COMPANY.

NOTICE is Hereby Given, that the ORDINARY HALF-YEARLY GENERAL MEETING of this Company will be held at the "Bell" Hotel, Bromley, Kent, on Tuesday, the 23rd day of February, 1904, at Six o'clock p.m. precisely, to receive the Report of the Directors, with the Balance-Sheet certified by the Auditors, to declare a Dividend, to elect Two Directors and an Auditor on retirements by rotation, and to transact generally the business of a General Meeting.

The TRANSFER BOOKS WILL BE CLOSED from the 6th of February to the 23th of February, both days inclusive.

By order of the Board,
HENRY W. AMOS,
Secretary.

Offices: 156, High Street,
Bromley, Kent, Feb. 6, 1904.

TAR Contracts Wanted on the Sliding-Scale or at Fixed Prices.

Managers and Secretaries desirous of selling to best advantage please communicate with DENT AND CO., Ouse Chemical Works, SELBY.

BRIGHTON AND HOVE GENERAL GAS COMPANY.

TO THE PROPRIETORS.

NOTICE is Hereby Given, that the ORDINARY HALF-YEARLY GENERAL MEETING of the Proprietors of the Company will be held at the Company's Offices, No. 5, Great Winchester Street, Old Broad Street, London, on Friday, March 4, 1904, at Two o'clock in the afternoon precisely, to receive the Report of the Directors and the Accounts of the Company for the Half Year ended the 31st of December, 1903, to declare Dividends, to elect a Director, to appoint a Special Auditor, and for other Purposes.

The TRANSFER BOOKS of the Company WILL BE CLOSED from the 20th of February to the 4th of March, both days inclusive.

By order,
ERNEST L. BURTON,
Secretary.

5, Great Winchester Street,
Old Broad Street, London, E.C.
Feb. 12, 1904.

RIDDINGS DISTRICT GAS COMPANY.

NOTICE is Hereby Given, that the ORDINARY HALF-YEARLY MEETING of the Shareholders of the above Company will be held at the Offices of the Company, No. 30, Gracechurch Street, in the City of London, on Monday, the 29th day of February, 1904, at 11.30 o'clock in the forenoon precisely, to receive the Report of the Directors and the Accounts for the Half Year ended the 31st day of December last, to declare a Dividend, to elect Directors and an Auditor in the place of those retiring by rotation, and to transact the General Business of the Company.

The TRANSFER BOOKS WILL BE CLOSED from the 16th to the 29th of February, both inclusive.

By order of the Board,
ERNEST W. DREW,
Secretary.

Offices: 30, Gracechurch Street,
London, Feb. 12, 1904.

ISSUES BY AUCTION OF GAS AND WATER STOCKS AND SHARES.

MR. ALFRED RICHARDS begs to notify that his ISSUES by AUCTION under PARLIAMENTARY POWERS of STOCKS and SHARES in LONDON, SUBURBAN, and PROVINCIAL GAS and WATER COMPANIES take place PERIODICALLY at the Mart, TOKENHOUSE YARD, E.C.

Terms for Issuing such Capital, and also for including Gas and Water Stocks and Shares belonging to Private Owners in these Periodical Sales, can be obtained on application at MR. ALFRED RICHARDS' OFFICES, 18, FINSBURY CIRCUS, E.C.

SUNDERLAND AND SOUTH SHIELDS WATER COMPANY.

IMPORTANT SALE OF WATER STOCK.

TO BE SOLD by Auction, in the Long Room of the Queen's Hotel, Fawcett Street Sunderland, on Thursday, Feb. 25, 1904, at Two o'clock in the afternoon prompt,

Mr. ATKINSON GIBSON, AUCTIONEER,

£10,000 (Nominal) of ADDITIONAL ORDINARY CAPITAL STOCK

(Maximum Dividend 5 per cent.), authorized to be created and issued under the powers contained in the Sunderland and South Shields Water Act, 1891.

The above Stock will be entitled to dividend from the 1st day of January, 1904, and be registered in the name of the purchaser *free of charge*.

A deposit of 10 per cent. will be required at the time of Sale; the remainder to be paid on or before the 1st day of March, 1904.

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THE
CITY OFFICES
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J. & H. ROBUS,
will in future be
FIRST FLOOR
ROOMS,
279, 279E, 280, 281, and 282
(in lieu of
388 to 390,
SECOND FLOOR,
as hitherto),
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GAS AND CANNEL COAL MERCHANT,
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ALFRETON IRON-WORKS, DERBYSHIRE,

AND

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Manufacture and keep in Stock at their Works (also large stock in London)

PIPES and CONNECTIONS, 1¼ to 48 inches in diameter, and make and erect to order RETORTS, PURIFIERS, and TANKS, with or without planed joints, COLUMNS, GIRDERS, SPECIAL CASTINGS, &c., required by Gas, Water, Railway, Telegraph, Chemical, Colliery, and other Companies.

NOTE.—Makers of HORSLEY'S PATENT SYPHONS. These are cast in one piece, without Chaplets; doing away with Bolts, Nuts, and Covers, and rendering Leakage impossible.

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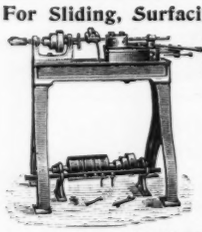

Lathes and Tools of my make may be inspected by any intending purchaser at addresses given below.

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Class A lifts 24 ft.
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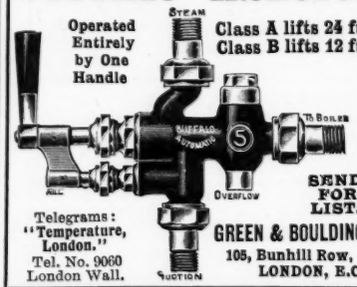

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For use in the

RECOVERY OF SULPHUR,

Also Removal of last Traces of

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SILICA BLOCKS, BRICKS, AND CEMENT

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These Goods (largely used in Gas, Glass, Iron, and Steel Works) are, on account of their

GREATER DURABILITY,

Strongly recommended where EXCESSIVE HEATS have to be maintained.

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WITHIN THE LIMITS OF GREAT BRITAIN, IRELAND, AND THE COLONIES, AND SOME OTHER COUNTRIES; AND THEY WILL HAVE PLEASURE IN ANSWERING ALL INQUIRIES REGARDING SAME THAT THEY MAY BE FAVOURED WITH.

THIS SYSTEM HAS BEEN ADOPTED WITH VERY MARKED SUCCESS ON THE CONTINENT, WHERE DURING THE PAST YEAR (THE FIRST OF ITS APPLICATION) THERE HAVE BEEN ORDERED MORE THAN

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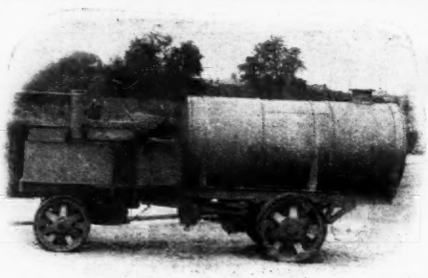

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TIP WAGONS!
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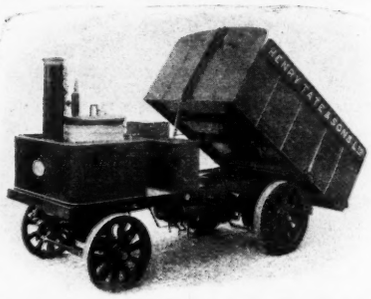

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Published Weekly

THE LUCAS LIGHT RECORDER

Price 0d

Issued in the interests of the Gas Industry and the finest high-power Gas Lamp known

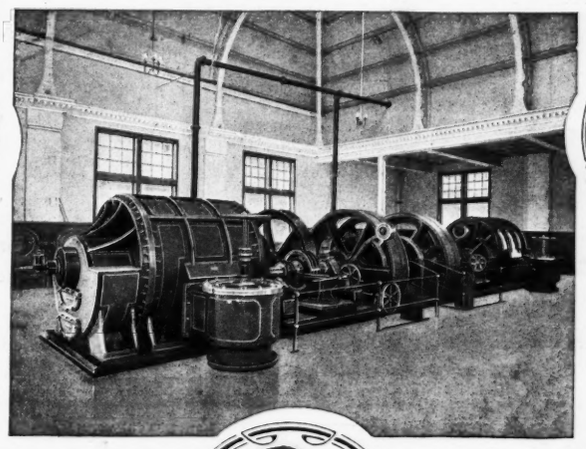
No. 28.] [*Tuesday, February 16, 1904.*

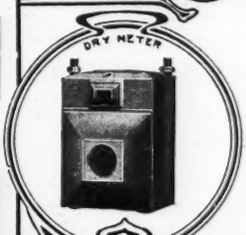
A Delicate Compliment

was paid the Lucas Light a short time ago at Ventnor, Isle of Wight. We are indebted to Mr. John S. Ineson, Secretary to the Ventnor Gas and Water Company, for an account of the difficulties which he has met with in attempting to get a Lucas Lamp fixed in that town, the Electric Company, for one thing, offering to fix arc lamps free of charge! When, at length, Mr. Ineson was enabled to instal a Lucas Lamp in the High Street, it seems to have brought the resentment felt in certain quarters to the boiling-point. Two days after the lamp was fixed, someone shoved a stick through the bottom of it, doing some damage to the interior. Mr. Ineson at once offered a reward of £5 for certain desirable information; and it now remains to be seen whether five good sovereigns will be potent enough to run the culprit to earth.

In the meantime we can only offer Mr. Ineson our most sympathetic regrets. The path of gas companies is evidently a thorny one, but the victim in this case—in common with the writer—should derive much consolation from the compliment involved in the unsanguinary assault! It would be rude to talk explicitly about such delicate matters, and we therefore fall back on the explanation that some Ventnor hooligan, in a moment of distraction over the exceptional absence of darkness associated with the Lucas Lamp, and in the interests of his profession, resorted to violence. Some of us may know what it means to have great economic interests at stake, and "to understand is to forgive!" *Sapienti sat.*

R. LAIDLAW & SON,
LIMITED
GAS & WATER ENGINEERS,





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INSTALLATIONS OF INCLINED RETORTS COMPLETE.

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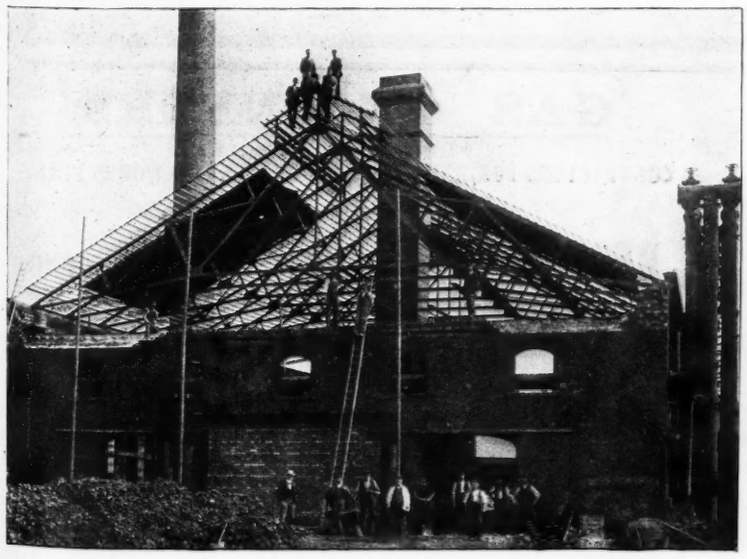
HALIFAX. *Telegrams:* "DRAKESON, HALIFAX." *Telephone:* "No. 43 HALIFAX."



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Made in 6 different sizes, from the Gem to the Lucas.

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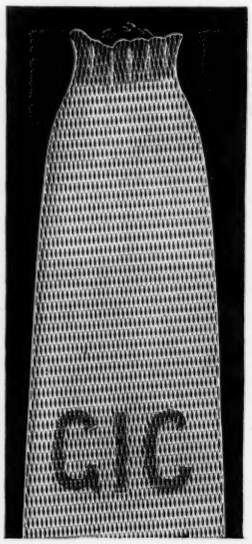

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G.I.C. „ „ Long	„ High Pressure	45s.
G.I.C. „ „ „	Lucas Lamp 7s.	per doz

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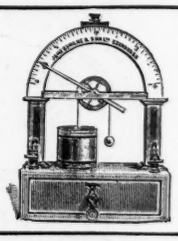

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For Prices apply to the **SOUTH METROPOLITAN GAS COMPANY,**

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709, OLD KENT ROAD, LONDON, S.E.

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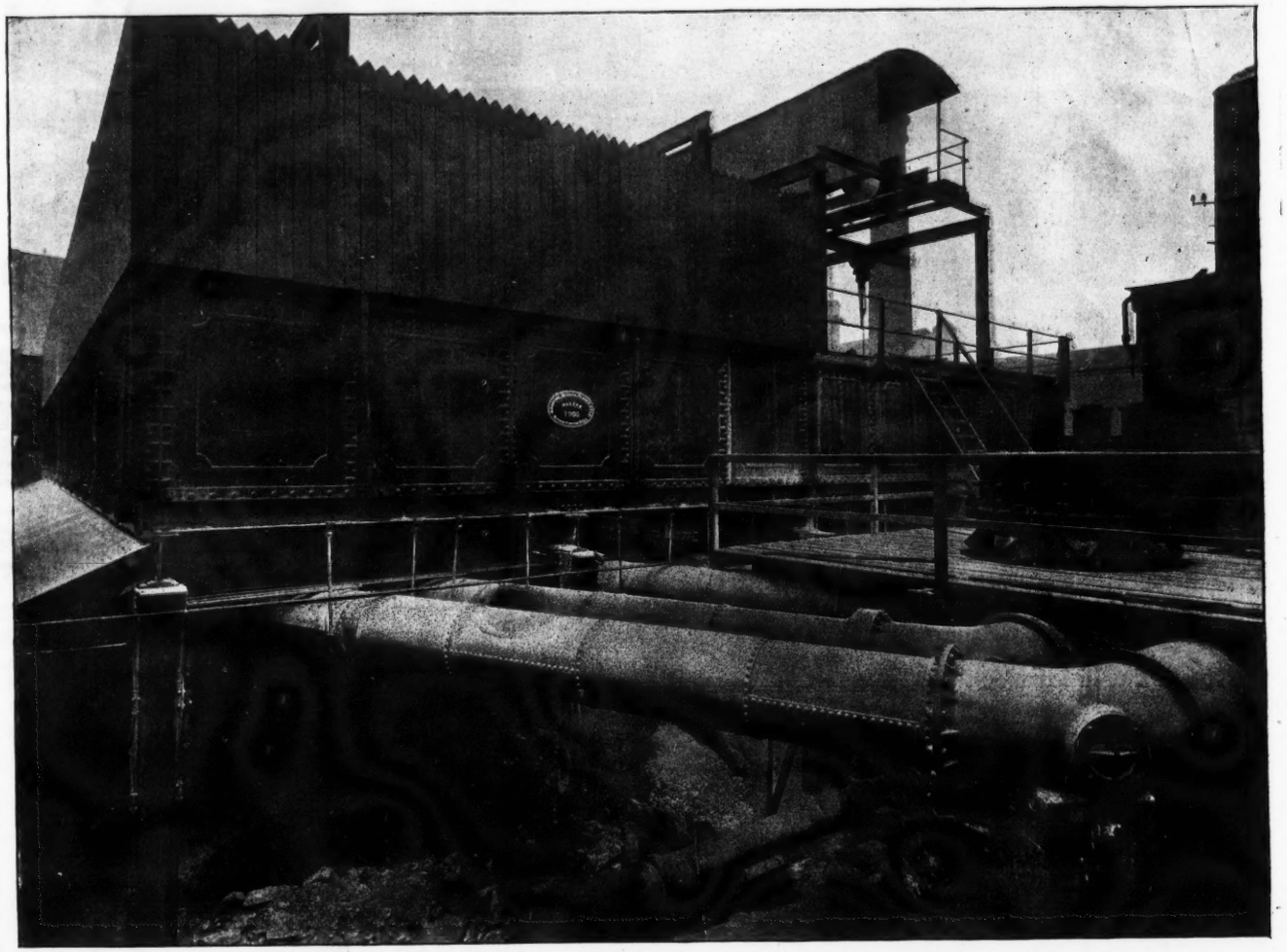

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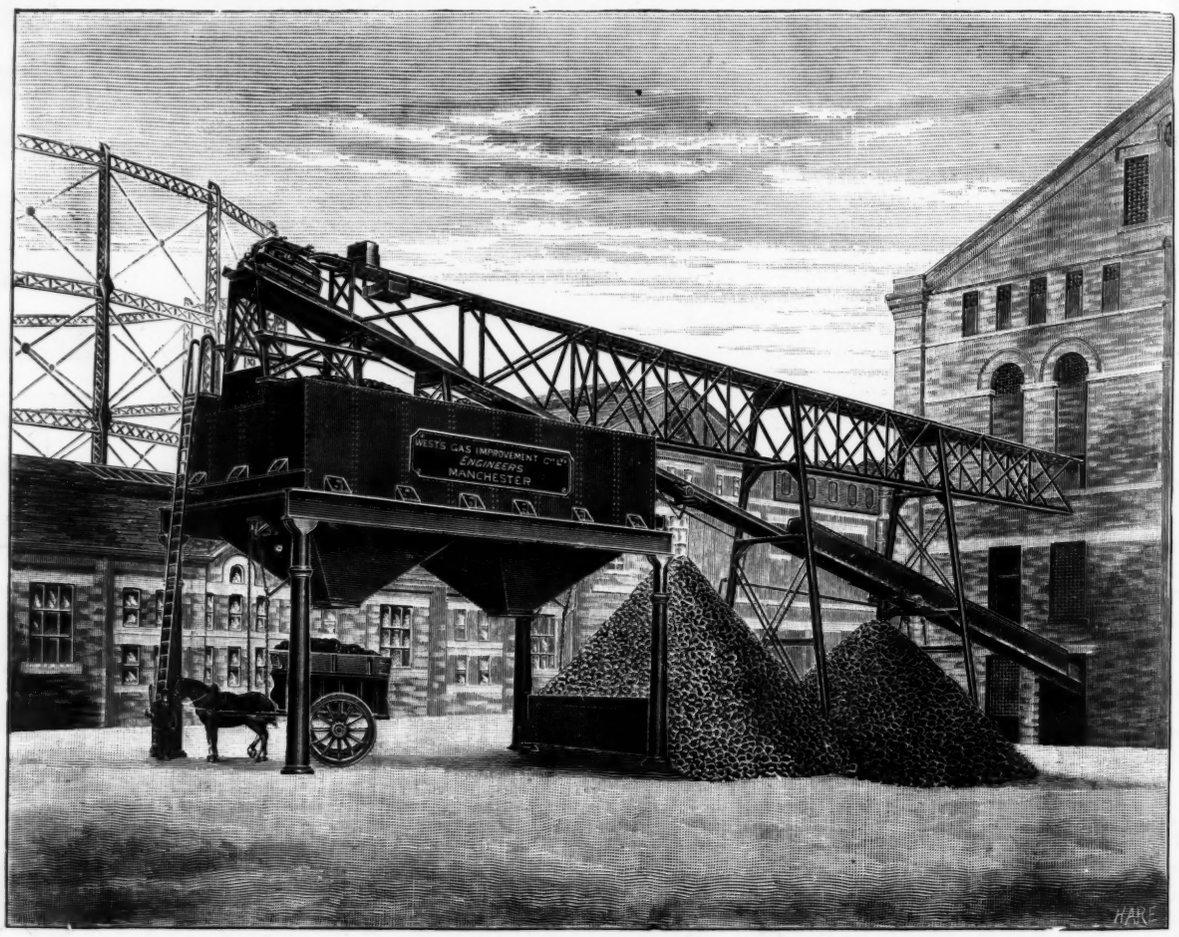

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Carbon Monoxide	15·0 „ „
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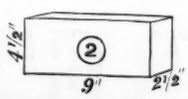
See **Prof. VIVIAN B. LEWES'S** Lecture before Society of Arts, reported in the "JOURNAL OF GAS LIGHTING," Dec. 9, 1902.



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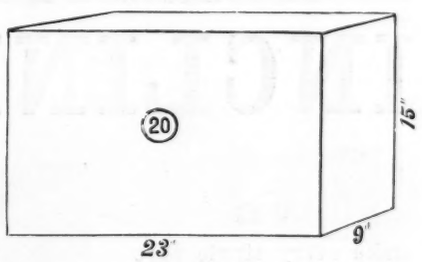

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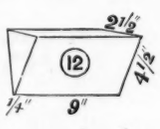

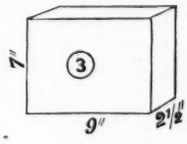

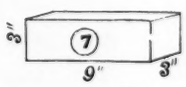

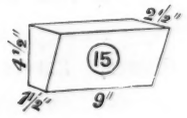

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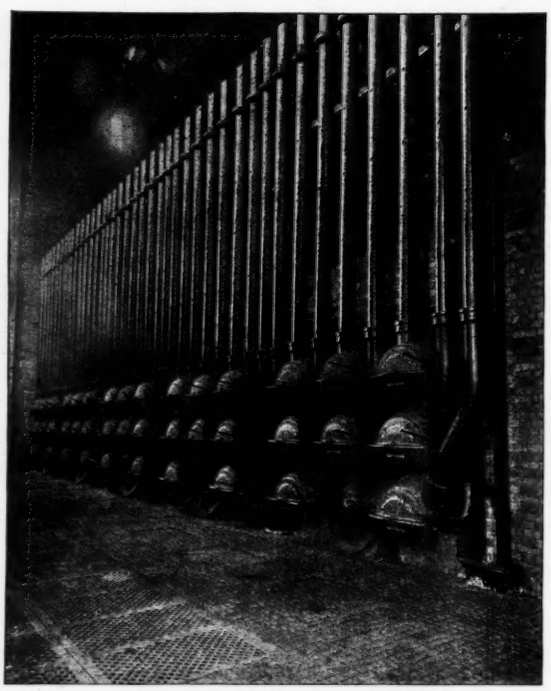

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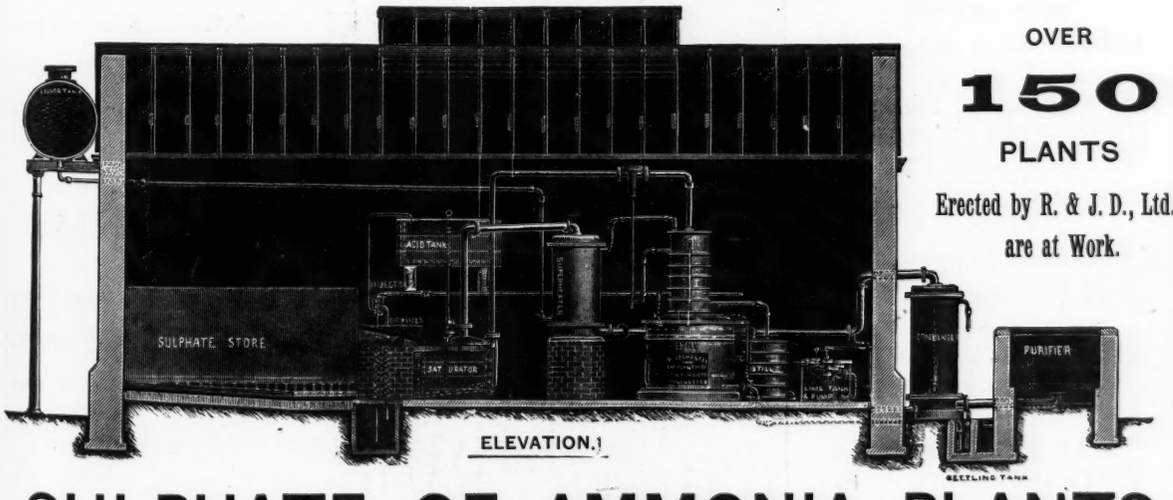

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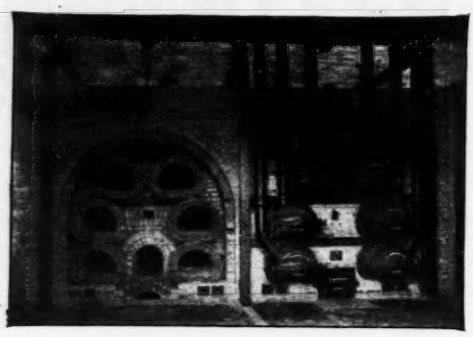

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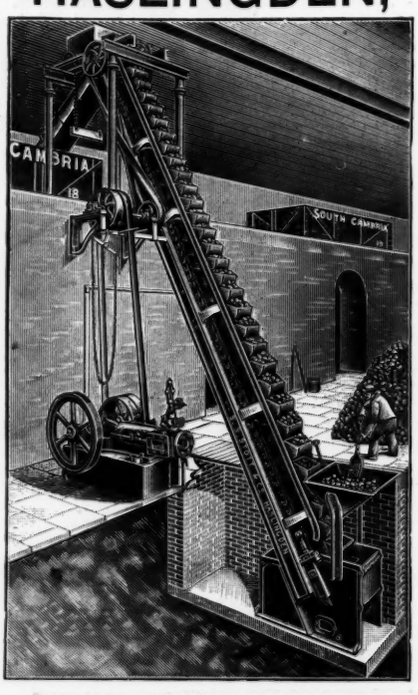

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